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POST TEST INFORMATION FOR THE ROCKWELL NASP AERO PROPULSION FORCE MODEL NAPF-1

TEST (NAP-21) IN THE NASA LANGLEY 14X22 FOOT SUBSONIC TUNNEL

ALAN HEALEY
NEIL BOSMAJIAN

NORTH AMERICAN AIRCRAFT
ROCKWELL INTERNATIONAL CORP.
PO BOX 92098
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APRIL 1990

FINAL REPORT

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AERONAUTICAL SYSTEMS CENTER
AIR FORCE SYSTEMS COMMAND
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A SCALE MODEL OF A NATIONAL AERO-SPACE PLANE, A ROCKETDYNE D791-4B AIRFRAME CONFIGURATION AND THE ROCKETDYNE AFTBODY NOZZLE, WAS TESTED IN THE NASA LANGLEY 14X22 FOOT SUBSONIC WIND TUNNEL, HAMPTON, VIRGINIA, FROM 17 JANUARY 1990 TO 21 MARCH 1990. THE PURPOSE OF THIS TEST WAS TO OBTAIN POWERED GROUND EFFECTS, VEHICLE FORCES AND MOMENTS, STABILITY AND CONTROL, LOW SPEED NOZZLE PERFORMANCE, POWERED INTERFERENCE, EFFECTS ON AERODYNAMICS, CONTROL SURFACE HINGE MOMENTS, AND NOZZLE AFT BODY ACOUSTIC DATA. THESE EFFECTS WERE INVESTIGATED AT MACH 0.2. DATA WAS OBTAINED IN 440 RUNS.

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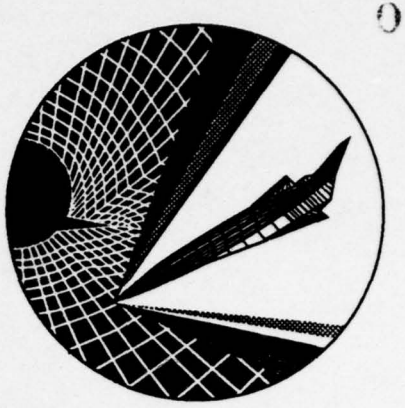

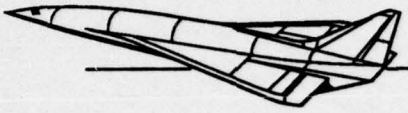

POST TEST INFORMATION FOR THE ROCKWELL NASP AERO PROPULSION FORCE MODEL NAPF-1 TEST (NAP-21) IN THE NASA LANGLEY 14 x 22 FOOT SUBSONIC TUNNEL(U)

CONTRACT NUMBER F33657-86-C-2127

PREPARED BY

ALAN J. HEALEY
TEST SUPPORT
NATIONAL AEROSPACE PLANE

APPROVED BY

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Los Angeles, California 90009

RESULTS OF THE ROCKWELL NASP AERO PROPULSION FORCE MODEL NAPF-1 TEST (NAP-21) IN THE NASA LANGLEY 14 x 22 FOOT SUBSONIC TUNNEL (U)

by

A. J. Healey

Test Support

National Aero-Space Plane

ABSTRACT

A scale model of a National Aero-Space Plane, a Rocketdyne D791-4B airframe configuration and the Rocketdyne aftbody nozzle, was tested in the NASA Langley 14 x 22 foot subsonic wind tunnel, Hampton, Virginia from 17 January, 1990 to 21 March, 1990. The purpose of this test was to obtain powered ground effects, air vehicle forces and moments, stability and control, low speed nozzle performance, powered interference effects on aerodynamics, control surface hinge moments, and nozzle aft body acoustic data. These effects were investigated at Mach 0.2. Data was obtained in 440 runs. This report does not contain any classified data or figures. For such information refer to the NASP pretest report NA 89-187 and NASA test data NASA R 90-4 , both of which are located in the Rockwell NASP Technical Information Center at Downey.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 (U) This document presents a summary of the NASP Aero Propulsion Force Model NAPF-1 Low Speed Ground Effects Test (NAP-21). The model, instrumentation, installation, and test conditions are described briefly, and a schedule of completed runs and anomalies are included.

1.2 (U) A scale model of the Rocketdyne D791-4B airframe configuration and the Rocketdyne aftbody nozzle was tested in the NASA Langley 14 x 22 subsonic wind tunnel, Hampton, Virginia. The model was shipped to Langley on January 17, 1990 and model installation in the test section began February 12, 1990. Testing began February 20, 1990 and completed March 21, 1990.

1.3 (U) The primary purpose of this test was to obtain powered ground effects, air vehicle forces and moments, stability and control, low speed nozzle performance, powered interference effects on aerodynamics, control surface hinge moments, and nozzle aft body acoustic data. The test also included some side slip angle runs to aid in the analysis of cross wind effects in ground effect .

1.4 (U) All test objectives were met. On-site preliminary analysis of the data is included in section 8.2.

1.0 INTRODUCTION (Con't)

1.5 (U) Summary:

Test Facility:	NASA Langley 14 x 22 Foot Subsonic Tunnel
Facility Test Number:	372
Test ID Number	NAP-21
Installation Date:	12 February, 1990
Test Start Date:	20 February, 1990
Test Completion Date:	21 March, 1990
Test hours:	247 hours
User Occupancy Hours:	428 hours
Number of Runs:	440
Mach Number	0.2
Dynamic Pressure	60 psf
Angle of Attack	-4° to +16°
Beta Range	-4 °, 0° to 8°
Model:	NAPF-1 (60"-scale D791-4B)

1.6 (U) The following personnel were responsible for the NASP Aero Propulsion Force test:

Test Engineers:	Alan J. Healey	213-922-0682
	Neil W. Bosmajian	213-922-0026
Data Analysis:	Deloy C. Olsen	
	Dave E. Berndt	
	Colin M. Mc Kinney	
	Mike Froehlich	
Facility Test Engineers:		
	Greg Gatlin	804-864-5065
	John Paulson	804-864-5071

1.0 INTRODUCTION (Con't)

1.7 (U) All inquires regarding this wind tunnel test program should be directed to:

Rockwell International
12214 Lakewood Blvd.
Downey, California 90241
Attn: Alan Healey
M/S NA 40
(213) 922-0682

2.0 REMARKS

2.1 (U) Table 3 is a detailed list of all known anomalies,events, and remarks regarding the model, instrumentation, data and programming during the test.

2.2 (U) The NASA/Langley computer was not reading the ESP pressures in their proper sequencing order which resulted in incorrect pressures being used to calculate, area pressure, and balance cavity pressure corrections. This was due to an error in the numerical sequence set up of the ESP cables to the ESP scanner box. This sequencing error was corrected and accounted for through a computer program change (Table 3 run 158).

2.3 (U) Numerous problems were encountered with the NASA/Langley height readout. The sector head which traverses the model up and down would slip approximately 1 to 1.5 inches when fully traversed. The height L.E.D. readout had to be zeroed every 4 to 6 runs.

2.4 (U) Pressure reference lines from the cannon/knuckle to the ESP modules were continually being pinched off by the blade strut cover, tight duct tape, and wire & tubing shift during test runs.

2.5 (U) Ambient temperature and model temperature above 105°F appeared to affect the ESP readout and zero pressure drift in the forward ESP module.

2.6 (U) Condensation build-up electrically grounded the metric to non-metric part of the model. A heat gun was used to dry out any remaining water. This action dried out the excess water, but inadvertently melted pressure reference lines. A complete model break down followed in order to replace the melted pressure lines.

3.0 TEST FACILITY DESCRIPTION

3.1 (U) The NASA Langley 14 x 22 foot Subsonic Tunnel consists of a closed circuit, single return, continuous flow atmospheric type wind tunnel and a model preparation area (MPA).

3.2 (U) The wind tunnel test section measures 14.5 feet high, 21.75 feet wide and approximately 50 feet long and may be configured closed with the walls in place, open with the walls and ceiling raised, and slotted with slots in the floor, ceiling, and walls. The test section floor is composed of two removable floor sections which may be a combination of model support carts, moving ground belt, or a slotted floor section. Also, floor boundary layer control is provided by a suction device in front of the first floor section. A high pressure air station and motor generators are available for model power. The test section is viewed through windows from the main control room where the tunnel and model controls are located. The test section is serviced by test site 1 which is located in a room beneath the test section.

3.3 (U) The model preparation area is a large, enclosed high-bay area. A high-pressure air station and a motor generator distribution box are available for powered models. A second floor control console overlooks the MPA and provides controls for the air station and motor generators. The MPA has five model interface stations hereafter called test sites (#2, #3, #4, #5, and #6) which may be shared by several models depending upon their data requirements. A model-support cart system was designed to permit models to be installed on a cart in the MPA and rolled into the wind tunnel test section fully assembled and calibrated.

3.0 TEST FACILITY DESCRIPTION (Con't)

3.4 (U) This tunnel is capable of force, moment and pressure studies. A moving belt ground plane with boundary layer suction and variable speed capabilities for operation at test section flow velocities can be installed for ground effects tests. For this test the moving belt ground plane was not used, however, the boundary layer suction device was used. A universal model support system utilizes a three joint rotary sting with +45° of pitch, +45° of yaw and 6 feet of vertical traverse. This system is mounted on a horizontal turntable with +165° of rotation. Models can be powered with either high pressure air (15 lb/sec at 5,000 psia) or variable frequency electric systems. Data are recorded with 60 channels and reduced off site.

4.0 MODEL DESCRIPTION

4.1 General

4.1.1 (U) The model used for this test was a 60" scaled representation of a modified Rocketdyne D791-4B airframe configuration. The model was designated as NAPF-1 and the assigned test identification code was NAP-21. The lower forebody was a representation of the Rockwell baseline vehicle D791-10R (model station 0 to 18.25, Drawing D791-10R-900), with a faired over inlet starting at model station 18.25 and continuing to the engine module. The upper fuselage surface of the model was extended outward from the baseline contour to provide the required internal area needed for the dual-flow balance and the internal nozzle flow passage. The model baseline configuration was the modified D791-4B vehicle with: flow module -601 (w/cowl flap angle δ=0°), landing gear on, nozzle flow fences on, and all control surface deflections at 0°.

4.1.2 (U) The model control surfaces consisted of; elevon angles of 0°, ±10°, & ±20°; body flap angles of 0°, ±10°, & ±20° and speed brake angles of ΔSB 40°, which were manually set and held in place by brackets and pins.

4.1.3 (U) The elevons comprise all that part of the wing panels aft of the elevon hinge line x= 52.445 and outboard of butt line B.L. = ± 3.28. The left hand elevon was gaged to obtain hinge moment data and the right hand elevon instrumented with pressure taps.

4.1.4 (U) One set of body flaps were fabricated out of Armco 17-4 stainless steel with three pairs of brackets to achieve the desired deflection angles (ref WT 01007-24). The brackets were reversed to obtain the negative deflections. The left hand body flap bracket was gaged for hinge moment measurements at 0° and ±20°. The ±10° deflected body flap was not gaged. Static pressure taps were located on the lower surface of the right body flap.

4.1.5 (U) Speed brake deflection was achieved by deflecting the elevons and body flap together. The first speed brake configuration, ΔSB 40°, was accomplished by deflecting the body flap up -20° and the elevons down +20°. The second speed brake configuration, ΔSB 20°, was not tested.

4.1.6 (U) The wing was constructed of Armco 17-4 stainless steel and had swept leading edge clipped delta planform with a flat lower surface which was parallel to the wing reference plane. The wing leading edge sweep was 79.5° and the dihedral angle approximately 25 degrees with +1 degree of incidence. Static pressure taps were located on the lower surface of the right wing.

4.1.7 (U) The mid fuselage block, model station 23.0 to 33.641, contained two pressure drop plates located at model stations 24.5 and 29.1. These pressure drop plates were used to help regulate the pressure and velocity of the internal air flow before it reached the nozzle throat. The first pressure drop plate (WT 01007-206) at MS=24.5 was 0.10 inches thick with 309 drilled holes for a total open area of 0.4691 square inches. The second pressure drop plate (WT 01007-205) at MS=29.1 was 0.10 inches thick with 309 drilled holes for a total open area of 1.047 square inches.

4.1.8 (U) A pair of removable nozzle flow fences were constructed out of Armco 17-4. These flow fences were mounted on the outboard edges of each side of the external nozzle just aft of the internal nozzle exit plane. The flow fences were removed to check their effectiveness in controlling lateral plume divergence.

4.1.9 (U) Landing configuration included one pair of main landing gear, left and right, and one nose landing gear assembly (ref drawing WT 01007-10) . The wheels for the nose assembly were constructed of stainless steel and the nose gear strut of Armco 17-4. The wheels for the main gear assembly were constructed of 7075-T6 aluminum and the main gear strut of Armco 17-4.

4.2 Flow Modules

4.2.1 (U) Two interchangeable flow modules (-601 & -701) were built for this test, ref. WT 01007-6, WT 01007-7. Due to limited time and poor mating between module 701 and the external nozzle, module 701 was not tested . Both modules were made of Armco 17-4 and had 12 flow paths with 11 splitters. The flow paths were set at ±4°, ±12°, ±20°, ±28°, ±36°, and ±44°. The eleven splitters were set at 0°, ±8°, ±16°, ±24°, ±32°, ±40° with a half splitter at ±48° (Figures 1 &2). The total nozzle throat area was 2.51797 square inches for module -601.

4.2.2 (U) The distinctive difference between module 601 and 701 was their cowl flap deflection angle. Flow module 601 has a cowl flap deflection angle of 0° and module 701 had an upward cowl flap deflection angle of -9° .

4.3 Aft Fuselage

4.3.1 (U) The aft fuselage lower surface (external nozzle) was constructed modeling the Rocketdyne -4B configuration. The nozzle surface contained pressure, temperature, and acoustic instrumentation as shown in Figure 3.

5.0 INSTRUMENTATION

5.1 General

5.1.1 (U) The model was instrumented with 181 orifices to measure surface static pressures on the vehicle, but 52 of the pressure taps were eliminated as a result of NASA/Langley inability to support 48 port ESP modules. The following is a summary of those measurements that were available:

Static Pressures:	Actual	Planned
External Nozzle:	76	102
Upper Strut	16	22
Right Wing	8	9
Fuselage Side	16	20
Flow Module - External	3	17
Flow Module - Internal	2	3
Elevon	2	2
Body Flap	5	5
Balance Cavity	1	1
TOTAL	129	181
Total Pressures:		
Flow Module - Internal	6	7
Thermocouples:		
External Nozzle	0	21
Balance Cavity	1	1
ESP Module	1	1
Flow Module - Internal	2	2
Kulites		
External Nozzle	7	8
Fuselage Side	3	3

5.1.2 (U) Four 32 port ±15 psid Electronically Scanned Pressure (ESP) scanners were employed to measure all the static pressures except for the internal flow module pressures. One 32 port ±45 psid ESP scanner was used to measure 6 total pressures and 2 static pressures located in the internal flow module.

5.1.3 (U) Table 1 lists the correlation between the NASA/Langley numbering system and Rockwell's pressure tap numbering system and pressure tap codes.

5.2 Temperature Instrumentation

5.2.1 (U) The 21 coaxial thermocouples located on the external nozzle were not measured during this entry. The four chromel constantan thermocouples were used to measure their respective local temperatures (see 5.1.1).

5.3 Kulite Instrumentation

5.3.1 (U) Eleven XCE 093 series Kulites were used to obtain fluctuating pressure data. Eight of the eleven kulites were located on the external nozzle surface, but only seven of the eight were used(ref WT01007-21) Figure 3. The remaining three kulites were located on the right side of the aft fuselage (ref WT 01007-21) . These data were recorded on a facility-supplied FM tape recorder using WB group I at 60 ips, with a frequency response DC to 40 KC. The center frequency was 216 KHz.

5.4 Strain Gage Instrumentation

5.4.1 (U) Hinge moments were obtained from 350 ohm strain gage bridges mounted on the brackets of the left body flap and on the shaft of the left elevon.

5.4.2 (U) The 0°, +20°, & -20° brackets of the body flap were gaged with a bending strain gage model WK-06-06TW-350. The ±10° brackets were not gaged. The hinge line for the body flap is at model station 56.704.

5.4.3 (U) The left elevon was gaged at its shaft with a torsion strain gage to obtain hinge moment data at 0°, ±10°, & ±20°. The hinge line for the elevons is at model station 52.455.

6.0 MODEL INSTALLATION

6.1 (U) The model was strut mounted and was designed to obtain nozzle thrust - minus - drag data, fuselage aftbody force and moment data in the presence and absence of simulated engine exhaust flow. A 47.750° swept strut was attached to the aft end of the model in the vertical tail location. The model was mounted upright on the strut (Figure 4). The strut contained a flow-through duct to channel high pressure air to the model for nozzle exit flow simulation and a separate duct for model instrumentation (ref. WT01007-15). The strut in turn was attached to Rockwell's supplied strut adaptor which was connected to NASA/Langley's long cannon via a NASA supplied knuckle and roll coupling.

6.2 (U) Two knuckles were employed to cover the required angle of attack range. The first installation (Figure 4) covered the lower pitch angles from -4° to +12° while the second assembly, the 24° knuckle, provided for the higher range of 12° to 16°. The second assembly had the roll coupling mounted after the 24° knuckle.

6.3 (U) The General Dynamics/Convair Division C-15-2.5 A-I Dual Flow-Through 6-Component Force Balance was fixed to the strut with two push-on screws, and held in roll by a roll pin. The balance adapter was slipped over and pinned to the balance. The upper aft fuselage was then mounted on the balance assembly and pinned to the adapter. A grounding strip was affixed around metric gap.

6.4 (U) The dimensions of the General Dynamics/Convair Division C-15-2.5 A-I Dual Flow-Through 6-Component Force Balance, geometry relating the model reference center and the balance center can be found in reference NA 89-187.

6.0 MODEL INSTALLATION (Con't)

6.5 (U) All electrical cables and reference pressure tubes were routed from the model through the blade strut and out the strut adaptor along the long canon down tunnel support to the electrical patchboard located below the test section. The one inch high pressure air supply line was also routed to the same area and connected to the tunnel high pressure supply system. To guard against the turbulence caused by the nozzle exhaust and general air flow, the bundles of cables and tubes were tape wrapped to the strut adaptor and long canon.

7.0 TEST CONDITIONS & PROCEDURES

7.1 (U) The NAP-21 test was conducted at a constant Mach number of 0.2 and a dynamic pressure of 60 psf. Two dynamic pressure sweeps from 0 to 80 psf were performed to confirm that the Re effects on drag were stable at 60 psf.

7.2 (U) The test variables included elevon deflection; 0°, ±10°, ±20°, body flap deflections; 0°, ±10°, ±20°, speed brake deflections, NPR settings; 75%, 82%,100%, 112%, 125%, angle of attack ; -4°, 0°, 4°, 8°, 12°, 16°, Beta; -4°, 0°, 4°, 8°, nozzle flow fences on & off, and landing gear on & off. Data were obtained for all test variables.

7.3 (U) The GD C-15-2.5 A-I balance was completely calibrated up to maximum load capacity in July 1989 at GD's Convair Division in San Diego. A tape of the balance calibration matrix in NASA/Langley format including, interactions, pressure tares, etc., was sent to NASA/Langley. NASA/Langley performed a series of balance check loads to verify the GD calibration matrix.

7.4 (U) In-tunnel check loadings of the balance through the facility's data acquisition system was performed after installation to ensure the integrity of the total force and moment measurement system.

7.5 (U) Internal nozzle thrust tare calibrations for each NPR setting was conducted prior to testing. Mass flow measurements, balance supply pressure and nozzle pressure measurements were recorded for each data point. For these thrust tares, wing, body flap and external nozzle were removed from the model and the external nozzle was replaced with a non-metric shield to avoid jet impingement on the model.

7.6 (U) A complete hinge moment calibration was performed prior to the test at the Rockwell NAA Calibration Facility (ref WTL-090-4). In-tunnel check hinge moment loads were performed through the facility data system.

7.0 TEST CONDITION & PROCEDURES (Con't)

7.7 (U) Air pressures required for this test depended upon the NPR. The 75%, 100%, & 125% NPR corresponded to predicted nozzle throat pressures of approx. 31, 41 and 51psia. Balance supply pressures were set at 168, 228 and 288 psia to obtain the desired P_{t_n}. The corresponding mass flow rate for the 75%, 100% & 125% NPR settings were approximately 1.659, 2.212 and 2.765 lb/sec, respectively.

7.8 (U) The height variation for the ground effect testing was varied from wheels on ground (one inch above) to tunnel center line. h/L checks were made every opportunity the tunnel test section was open at which time the height L.E.D. was corrected.

7.9 (U) Using the required Mach number and dynamic pressure setting, a height sweep was performed for each configuration and power setting, including power off.

7.10 (U) The specific combinations of runs number, Mach number, model configuration, orientation, and control surface deflections are shown in the run log, Table 2

8.0 DATA PROCESSING

8.1 (U) Magnetic data tapes and tabulated printed data, NASA Langley Report R-90-4 books 1 thru 32, are available at the Rockwell NASP TIC. Observations and data analysis from the propulsion group and aerodynamics group are still pending.

8.2 (U) All test objectives were met. On-site preliminary analysis of the data indicates the following:

1. Stability axis data showed that increasing NPR increases pitching moment and decreases lift. The decrease in lift is attributed to the base drag increase and the change in the stream thrust vector angle.

2. Application of power produces a large positive pitching moment and increased lift at high angles of attack which would aid takeoff and landing characteristics.

3. Ground effect causes a suction effect at low attitudes and increased lift at takeoff angles of attack.

4. Unpowered body flap effectiveness shows excellent agreement with analytical estimates. Body flap control is significantly enhanced due to addition of power and in the presence of the ground (Figure 6, Alpha = 14°; Figure 7, Alpha = -4°).

5. Elevon effectiveness was slightly increased due to plume impingement.

6. Internal model flow system non-uniformities were encountered at total pressure tap #A3 during the entire test. This total pressure tap lies on the splitter between nozzle 4 and 5 in the internal nozzle as shown in Figure 1. This pressure spike of 2 to 4 psi caused a yawing moment and a non-uniform pressure distribution on the external nozzle surface. This anomaly requires additional analysis and may require a flow field survey of the nozzle exit plane to fully characterize the exit conditions

8.0 DATA PROCESSING (Con't)

7. The row of external nozzle static pressures that are in line with the center line of nozzle 7, see 'a' of Figure 3, indicates lower pressures than those in line with the center line of the splitters to either side of nozzle 7 (see 'b').

9.0 TEST MATRIX

9.1 (U) Table 2 is a list of all the wind-on and static runs for the NAPF-1 model at NASA/Langley 14 x 22 tunnel. From the planned 636 runs (reference NA-89-187), 440 runs were completed. Of those 440 runs, 71 were repeated for various reasons. Since Kulite data and pressure data could not be taken at the same time, several key runs were repeated to obtain the acoustic data. Other runs were repeated when it was discovered that reference pressure tubes were pinched. A number of baseline runs were repeated in order to check the validity of the data acquisition method, and to insure data repeatability. The runs eliminated from the original run schedule due to time constraints were 32 alternate cowl runs, 32 $\Delta 20°$ speed brake runs, and various angles of attack, power settings and betas runs.

10.0 CONCLUSION

10.1 (U) All objectives stated in the Pretest Information Report NA-89-187 have been achieved:

1. Powered and unpowered ground effects

2. Low speed nozzle performance

3. Powered interference effects on aerodynamics

4. Control surface hinge moments

5. Vehicle force and moment & stability and control

Further analysis will provide nozzle and plume flow definition, configuration effects, and more detailed control surface effectiveness.

11.0 REFERENCES

11.1 (U) NA89-187 "Pretest Information for the Rockwell NASP Aero Propulsion Force Model NAPF-1 Test (NAP-21) in the NASA Langley 14 x 22 Foot Subsonic Tunnel (U)" November 1989.

11.2 (U) NA89-116 "Structural Analysis of the NASP Aft Body Plume Wind Tunnel Model (NAPF-1)" April 1989.

11.3 (U) NASA R90-4 "NASA Langley Magnetic and Tabulated Data" April 1990.

11.4 (U) "14 x 22 Foot Subsonic Tunnel Test Engineer's Manual" March 1988.

11.5 (U) "User's Manual for the Langley Research Center 14 x 22 Foot Wind Tunnel Facility Data Acquisition System" September 1987.

12.0 TABLES

Table 1

Pressure Tap Numbering System

		Beta=0		
NASA /LANGLEY				
Computer	Tap #	Code	Location	Comments
Print Out #'s				
1	1	N1,01	External Nozzle	
2	2	N1,02	Nozzle 12 Exit Static	
3	4	N1,04	Nozzle 11 Exit Static	
4	5	N1,06	Nozzle 10 Exit Static	
5	6	N1,08	Nozzle 9 Exit Static	
6	8	N1,10	Nozzle 8 Exit Static	
7	10	N1,12	Nozzle 7 Exit Static	
8	11	N1,13	External Nozzle	
9	12	N1,14	Nozzle 6 Exit Static	
10	13	N1,16	Nozzle 5 Exit Static	
11	14	N1,18	Nozzle 4 Exit Static	
12	15	N1,20	Nozzle 3 Exit Static	
13	16	N1,22	Nozzle 2 Exit Static	
14	17	N1,24	Nozzle 1 Exit Static	
15	18	N1,25	External Nozzle	
16	19	N2,01	External Nozzle	
17	23	N2,12	External Nozzle	
18	24	N2,13	External Nozzle	
19	25	N3,01	External Nozzle	
20	27	N3,12	External Nozzle	
21	28	N3,13	External Nozzle	
22	29	N4,01	External Nozzle	
23	32	N4,06	External Nozzle	
24	36	N4,12	External Nozzle	
25	37	N4,13	External Nozzle	
26	38	N4,20	External Nozzle	
27	39	N4,25	External Nozzle	
28	40	N5,01	External Nozzle	
29	42	N5,12	External Nozzle	
30	43	N5,13	External Nozzle	
31	44	N6,01	External Nozzle	
32	47	N6,06	External Nozzle	
97	108	S1,6	Upper Strut	
98	109	S1,9	Upper Strut	
99	110	S2,5	Upper Strut	
100	111	S2,10	Upper Strut	
101	112	S3,2	Upper Strut	
102	117	S3,13	Upper Strut	
103	118	S4,6	Upper Strut	
104	119	S4,9	Upper Strut	
105	120	S5,6	Upper Strut	
106	121	S5,9	Upper Strut	
107	122	S6,1	Upper Strut	
108	124	S6,5	Upper Strut	
109	125	S6,7	Upper Strut	
110	126	S6,8	Upper Strut	
111	127	S6,10	Upper Strut	
112	129	S6,14	Upper Strut	
113	130	W1,1	Lower Right Wing	
114	131	W2,1	Lower Right Wing	
115	132	W2,2	Lower Right Wing	
116	133	W3,1	Lower Right Wing	
117	134	W3,2	Lower Right Wing	
118	143	BC	Balance Cavity	
119	136	W5,1	Lower Right Wing	
120	137	W5,2	Lower Right Wing	
121	138	W5,3	Lower Right Wing	
122	139	W6,1	Lower Right Wing	
123	140	W6,3	Lower Right Wing	
124	149	SR6,3	Right Side of Flow Module	
125	152	SR7,3	Lower Right Wing	
126	155	SR8,3	Lower Right Wing	

Table 1

Pressure Tap Numbering System

NASA /LANGLEY Computer Print Out #'s	Tap #	Code	Location	Comments
127	157	SR9.2	Lower Right Wing	
128	160	SR10.3	Lower Right Wing	After run 449 tap160 became a reference line pressure
33	49	N6.10	External Nozzle	
34	50	N6.12	External Nozzle	
35	51	N6.13	External Nozzle	
36	52	N6.20	External Nozzle	
37	53	N6.25	External Nozzle	
38	54	N7.01	External Nozzle	
39	57	N7.06	External Nozzle	
40	59	N7.10	External Nozzle	
41	60	N7.12	External Nozzle	
42	61	N7.13	External Nozzle	
43	62	N7.20	External Nozzle	
44	63	N7.25	External Nozzle	
45	64	N8.01	External Nozzle	
46	65	N8.06	External Nozzle	
47	66	N8.10	External Nozzle	
48	67	N8.12	External Nozzle	
49	68	N8.13	External Nozzle	
50	69	N9.01	External Nozzle	
51	71	N9.06	External Nozzle	
52	73	N9.10	External Nozzle	
53	74	N9.13	External Nozzle	
54	75	N9.20	External Nozzle	
55	76	N9.25	External Nozzle	
56	77	N10.13	External Nozzle	According the Nozzle group this tap was not reading correctly
57	141	SR1.1	Right Side of Flow Module	
58	142	SR2.1	Right Side of Flow Module	
	open		open	After run 449 this open tap became a reference line pressure
60	144	SR3.1	Right Side of Flow Module	
61	145	SR4.1	Right Side of Flow Module	
62	178	FO1	Center Line on Flow Module	
63	179	FO2	Center Line on Flow Module	
64	180	FO3	Center Line on Flow Module	
65	78	N11.01	External Nozzle	
66	79	N11.06	External Nozzle	
67	81	N11.13	External Nozzle	
68	82	N11.20	External Nozzle	
69	83	N11.25	External Nozzle	
70	84	N12.13	External Nozzle	
71	85	N13.01	External Nozzle	
72	86	N13.06	External Nozzle	
73	88	N13.13	External Nozzle	
74	89	N13.20	External Nozzle	
75	90	N13.25	External Nozzle	
76	91	N14.13	External Nozzle	
77	92	N15.01	External Nozzle	
78	93	N15.06	External Nozzle	
79	95	N15.13	External Nozzle	
80	96	N15.20	External Nozzle	
81	97	N15.25	External Nozzle	
82	98	N16.13	External Nozzle	
83	101	N18.13	External Nozzle	
84	102	N18.20	Body Flap	
85	103	N18.25	Body Flap	
86	104	N19.13	External Nozzle	
87	105	N19.16	Body Flap	
88	106	N19.20	Body Flap	
89	107	N19.25	Body Flap	
90	146	SR5.1	Right Side of External Nozzle	After run 449 tap146 became a reference line pressure
91	148	SR6.2	Right Side of External Nozzle	
92	150	SR7.1	Right Side of External Nozzle	
93	151	SR7.2	Right Side of External Nozzle	

Table 1

Pressure Tap Numbering System

NASA /LANGLEY Computer Print Out #'s	Tap #	Code	Location	Comments
94	156	SR9.1	Right Side of External Nozzle	
95	159	SR10.1	Right Side of External Nozzle	
96	161	SR11.2	Right Side of External Nozzle	
129	181	A1	Tot. Pres. Radius 4.483 (Rt)	
130	182	A2	Rad deg = 32	
131	183	A3	Rad deg = 16	
132	184	A4	Rad deg = 0	
133	185	A5	Rad deg = -16	
134	186	A6	Rad deg = -32	
135	187	A7	Tot. Pres. Radius 4.483 (Lft)	
	open		open	
137	176	DS1	Primary Flow Static	
138	177	DS2	Primary Flow Static	
	178	No DS3	Primary Flow	

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
80	20:05		20-Feb							0	0	0	1.5x10 6	on	on	Zero Thrust runs, 150 psi to 350 psi Δ50psi, #1 upper left
81	20:55		20-Feb							0	0	0	1.5x10 6	on	on	Zero Thrust runs, 150 psi to 350 psi Δ50psi, #1 lower left
82	21:35		20-Feb							0	0	0	1.5x10 6	on	on	Zero Thrust runs, 150 psi to 350 psi Δ50psi, #1 lower right
83	22:00	22:17	20-Feb							0	0	0	1.5x10 6	on	on	Zero Thrust runs, 150 psi to 350 psi Δ50psi, #1 upper right
84										0	0	0	1.5x10 6	on	on	
85			21-Feb			0	0			0	0	0	1.5x10 6	on	on	Static Thrust Run for Landing Gear Effectiveness
86				0	168	0	0			0	0	0	0	on	on	
87				0	187	0	0			0	0	0	0	on	on	
88				0	227	0	0			0	0	0	0	on	on	
89				0	288	0	0			0	0	0	0	on	on	
90			22-Feb	Sweep	0	0	0	81.284"		0	0	0		on	on	Q Sweep, 0 to 80 psf ΔQ=10psf, on Tunnel Cener Line
91			22-Feb	Sweep	0	12	0	81.284"		0	0	0		on	on	Q Sweep, 0 to 80 psf ΔQ=10psf, on Tunnel Cener Line
92			22-Feb	60	0	- 4	0	8.2	Yes	0	0	0	1.5x10 6	on	on	Upper Limit was 64.134"
93			22-Feb	60	0	0	0	6.65	Yes	0	0	0	1.5x10 6	on	on	Upper Limit was 81.309"
94			22-Feb	60	0	4	0	22.617"	Yes	0	0	0	1.5x10 6	on	on	Lower Limit was 21.934
95			22-Feb	60	0	12	0	2.7	Yes	0	0	0	1.5x10 6	on	on	Lower Limit was 57.774
96	17:45	17:50	22-Feb	60	168	12	0	59.394"	No	0	0	0	1.5x10 6	on	on	Bad ESP Data, Good Balance Data
97	17:50	18:04	22-Feb	60	168	4	0	23.656"	No	0	0	0	1.5x10 6	on	on	Bad ESP Data, Good Balance Data
98	18:04	18:27	22-Feb	60	168	0	0	6.6575"	No	0	0	0	1.5x10 6	on	on	Bad ESP Data, Good Balance Data
99	18:27	18:43	22-Feb	60	168	- 4	0	8.2486"	No	0	0	0	1.5x10 6	on	on	Bad ESP Data, Good Balance Data
100	18:43	19:00	22-Feb	60	187	0	0	6.6499"	No	0	0	0	1.5x10 6	on	on	Bad ESP Data, Good Balance Data
101	19:00	19:20	22-Feb	60	255	0	0	6.6162"	No	0	0	0	1.5x10 6	on	on	Bad ESP Data, Good Balance Data
102																Run Number Skipped
103	9:50		23-Feb	60	0	- 4	0	0.1371	No	0	0	0	1.5x10 6	on	on	Repeat of 92
104	10:14		23-Feb	60	0	0	0	0.1106	No	0	0	0	1.5x10 6	on	on	Repeat of 93
105	11:00		23-Feb	60	0	4	0	0.377	No	0	0	0	1.5x10 6	on	on	Repeat of 94
106	11:10		23-Feb	60	0	12	0	0.9756	No	0	0	0	1.5x10 6	on	on	Repeat of 95
107			23-Feb						No	0	0	0	1.5x10 6	on	on	Weight Tares
108			23-Feb			- 4										No Final Zero, h/L came off line
109	15:50		23-Feb	60	0	12	0		No	0	0	0	1.5x10 6	on	on	Repeat of Run 95
110			23-Feb	60	0	8	0			0	0	0	1.5x10 6	on	on	
111	16:46	17:02	23-Feb	60	168	- 4	0	0.1369	No	0	0	0	1.5x10 6	on	on	Repeat of 99
112	20:50	21:10	23-Feb	60	168	- 4	0	0.137	No	0	0	0	1.5x10 6	on	on	20 min alpha=-4, Fixed ESP Interface Box, Repeat of Run 99

168=75% 228=100% 288=125%

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Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
113	21:16	21:45	23-Feb	60	168	0	0	0.1108	No	0	0	0	1.5x10 6	on	on	29 min alpha=0, Repeat of Run 113
114	21:49	22:03	23-Feb	60	168	4	0	0.3887	No	0	0	0	1.5x10 6	on	on	14 min alpha=4, Repeat of Run 97
115	22:05	22:13	23-Feb	60	168	8	0	0.6801	No	0	0	0	1.5x10 6	on	on	8 min alpha=8
116	22:17	22:24	23-Feb	60	168	12	0	0.9749	No	0	0	0	1.5x10 6	on	on	7 min alpha=12, Repeat of Run 96
117	22:30	22:50	23-Feb	60	187	0	0	0.1108	No	0	0	0	1.5x10 6	on	on	20 min, Repeat of Run 100
118	22:56	23:20	23-Feb	60	255	0	0	0.1105	No	0	0	0	1.5x10 6	on	on	24 min, Repeat of Run 101
119	14:58	15:11	26-Feb	60	228	-4	0	0.1376	No	0	0	0	1.5x10 6	on	on	65.833"
120	15:17	15:40	26-Feb	60	228	0	0	0.1107	No	0	0	0	1.5x10 6	on	on	82.384"
121	15:43	15:53	26-Feb	60	228	4	0	0.3766	No	0	0	0	1.5x10 6	on	on	84.066"
122	15:57	16:05	26-Feb	60	228	8	0	0.6672	No	0	0	0	1.5x10 6	on	on	40.033 to 84.046
123	16:05	16:10	26-Feb	60	228	12	0	0.9653	No	0	0	0	1.5x10 6	on	on	57.915 to 84.045
124	16:14	16:18	26-Feb	60	288	12	0	0.9644	No	0	0	0	1.5x10 6	on	on	57.866 to 84.028
125	16:20	16:27	26-Feb	60	287	8	0	0.6651	No	0	0	0	1.5x10 6	on	on	39.906 to 84.003
126	16:32	16:42	26-Feb	60	290	4	0	0.3727	No	0	0	0	1.5x10 6	on	on	22.362 to
127	16:46	17:10	26-Feb	60	289	0	0	0.1107	No	0	0	0	1.5x10 6	on	on	6.644 to81.8
128	17:20	17:34	26-Feb	60	287	-4	0	0.1367	No	0	0	0	1.5x10 6	on	on	8.2036 to 64.833
129	20:16	20:23	26-Feb	60	0	12	-4	0.9792	No	0	0	0	1.5x10 6	on	on	58.749 to 84.017 Nose Right
130	20:30	20:46	26-Feb	60	290	-4	4	0.1367	No	0	0	0	1.5x10 6	on	on	8.2005 to 65.736 Nose Left
131	20:55	21:23	26-Feb	60	291	0	4	0.1109	No	0	0	0	1.5x10 6	on	on	6.6554 to
132	21:24	21:34	26-Feb	60	288	4	4	0.3775	No	0	0	0	1.5x10 6	on	on	22.652 to 84.052
133	21:40	21:44	26-Feb	60	288	8	4	0.6638	No	0	0	0	1.5x10 6	on	on	39.826 to 84.014
134	21:46	21:50	26-Feb	60	288	12	4	0.9615	No	0	0	0	1.5x10 6	on	on	57.688 to 84.031
135	21:55	21:59	26-Feb	60	229	12	4	0.9598	No	0	0	0	1.5x10 6	on	on	57.6 to 84.064
136	22:02	22:08	26-Feb	60	229	8	4	0.6638	No	0	0	0	1.5x10 6	on	on	39.66 to 84.066
137	22:12	22:21	26-Feb	60	228	4	4		No	0	0	0	1.5x10 6	on	on	22.6 to
138	22:30	22:47	26-Feb	60	228	0	4	0.1111	No	0	0	0	1.5x10 6	on	on	6.6644 to 81.495
139	8:08	8:23	27-Feb	60	228	-4	4	0.1379	No	0	0	0	1.5x10 6	on	on	8.2769 to 65.730
140	8:28	5:46	27-Feb	60	168	-4	4	0.1382	No	0	0	0	1.5x10 6	on	on	8.2937 to 65.562
141	9:59	10:25	27-Feb	60	176	0	4	0.1111	No	0	0	0	1.5x10 6	on	on	6.6666 to 82.340

168=75% 228=100% 288=125%

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Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
142	10:29	10:39	27-Feb	60	170	4	4	0.3801	No	0	0	0	1.5x10 6	on	on	
143	10:40	10:43	27-Feb	60	167	8	4	0.669	No	0	0	0	1.5x10 6	on	on	
144	10:48	10:52	27-Feb	60	0	8	4	0.6681	No	0	0	0	1.5x10 6	on	on	
145	10:57	11:04	27-Feb	60	0	4	4	0.3775	No	0	0	0	1.5x10 6	on	on	
146	11:09	11:35	27-Feb	60	0	0	4	0.1108	No	0	0	0	1.5x10 6	on	on	
147	11:37	11:51	27-Feb	60	0	-4	4	0.1369	No	0	0	0	1.5x10 6	on	on	
148	13:00	13:20	27-Feb	60	229	0	0	0.111	No	0	0	0	1.5x10 6	on	on	Repeat of Run 120
149	13:38	13:49	27-Feb	60	288	-4	0	0.1377	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good,Repeat of Run 128
150	13:54	14:03	27-Feb	60	288	0	0	0.1113	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good, Repeat of Run 127
151	14:05	14:08	27-Feb	60	288	4	0	0.3834	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good, Repeat of Run 126
152	14:13	14:18	27-Feb	60	228	4	0	0.3814	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good, Repeat of Run 121
153	14:20	14:28	27-Feb	60	228	0	0	0.1106	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good, Repeat of Run 120
154	14:33	14:41	27-Feb	60	228	-4	0	0.1374	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good, Repeat of Run 119
155	14:44	14:52	27-Feb	60	166	-4	0	0.1368	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good, Repeat of Run 99
156	14:57	15:06	27-Feb	60	166	0	0	0.1109	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good, Repeat of Run 98
157	15:08	?	27-Feb	60	166	4	0	0.3739	No	0	0	0	1.5x10 6	on	on	Kulite Data No Good, Tape ran out, Repeat of Run 97
158	17:22	17:40	27-Feb	0	288	0	0	0.111	No	0	-10	0	0	on	on	Static runs for Body Flap Effectiveness
159	17:46	18:05	27-Feb	0	227	0	0	0.111	No	0	-10	0	0	on	on	Static runs for Body Flap Effectiveness
160	18:08	18:25	27-Feb	0	168	0	0	0.111	No	0	-10	0	0	on	on	Static runs for Body Flap Effectiveness
161	18:35	18:48	27-Feb	60	168	-4	0	0.1371	No	0	-10	0	1.5x10 6	on	on	M=0.2, Q=60psf
162	18:53	19:10	27-Feb	60	168	0	0	0.111	No	0	-10	0	1.5x10 6	on	on	
163	21:09	21:16	27-Feb	60	168	4	0	0.3887	No	0	-10	0	1.5x10 6	on	on	Before run 163 changed ESP numbering, Still questionable!
164	21:18	21:20	27-Feb	60	168	8	0	0.6791	No	0	-10	0	1.5x10 6	on	on	
165	21:23	21:28	27-Feb	60	228	8	0	0.6793	No	0	-10	0	1.5x10 6	on	on	
166	21:29	21:35	27-Feb	60	228	4	0	0.3891	No	0	-10	0	1.5x10 6	on	on	
167	21:40	21:58	27-Feb	60	228	0	0	0.111	No	0	-10	0	1.5x10 6	on	on	

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
168	21:59	22:10	27-Feb	60	228	-4	0	0.1373	No	0	-10	0	1.5x10 6	on	on	
169	22:17	22:28	27-Feb	60	288	-4	0	0.137	No	0	-10	0	1.5x10 6	on	on	
170	22:30	22:53	27-Feb	60	288	0	0	0.111	No	0	-10	0	1.5x10 6	on	on	
171	22:58	23:06	27-Feb	60	288	4	0	0.3892	No	0	-10	0	1.5x10 6	on	on	
172	23:08	23:11	27-Feb	60	288	8	0	0.6653	No	0	-10	0	1.5x10 6	on	on	
173	9:19	9:21	28-Feb	60	0	8	0	0.6778	No	0	-10	0	1.5x10 6	on	on	
174	9:23	9:29	28-Feb	60	0	4	0	0.3856	No	0	-10	0	1.5x10 6	on	on	
175	9:34	9:53	28-Feb	60	0	0	0	0.111	No	0	-10	0	1.5x10 6	on	on	
176	9:55	10:14	28-Feb	60	0	-4	0	0.1367	No	0	-10	0	1.5x10 6	on	on	
177	20:50	21:05	28-Feb	60	0	12	0	min	No	0	0	0	1.5x10 6	on	on	Repeat of Run 95
178	21:10	21:35	28-Feb	60	0	0	0	min	No	0	0	0	1.5x10 6	on	on	Repeat of Run 93
179	22:39	23:07	28-Feb	60	0	12	0	min	No	0	0	0	1.5x10 6	on	on	2 data points - short cals, Repeat of Run 95
180	8:00	9:00	1-Mar	0	168	0	0	0.111	No	0	0	0	0	on	on	short cals prior to every point, Repeat of Run 86
181	11:10	11:32	1-Mar	0	169	0	0	0.111	No	0	0	0	0	on	on	ESP reference on PA!! static runs, Repeat of Run 86
182	11:40	11:55	1-Mar	0	187	0	0	0.111	No	0	0	0	0	on	on	Repeat of Run 87
183	12:50	13:13	1-Mar	0	231	0	0	0.111	No	0	0	0	0	on	on	Repeat of Run 88
184	13:15	13:37	1-Mar	0	255	0	0	0.111	No	0	0	0	0	on	on	
185	13:43	14:20	1-Mar	0	288	0	0	0.111	No	0	0	0	0	on	on	Repeat of Run 89
186	14:20	14:34	1-Mar	60	0	-4	0	0.1368	No	0	0	0	1.5x10 6	on	on	repeat of baseline, Repeat of Run 92
187	14:37	15:05	1-Mar	60	0	0	0	0.1097	No	0	0	0	1.5x10 6	on	on	Repeat of Run 93
188	15:07	15:31	1-Mar	60	168	0	0	0.1107	No	0	0	0	1.5x10 6	on	on	Repeat of Run 98
189	15:33	15:48	1-Mar	60	168	-4	0	0.1369	No	0	0	0	1.5x10 6	on	on	Repeat of Run 99
190	15:54	16:15	1-Mar	60	187	0	0	0.1116	No	0	0	0	1.5x10 6	on	on	Repeat of Run 100
191	17:29	17:49	1-Mar	60	255	0	0	0.1109	No	0	0	0	1.5x10 6	on	on	Baseline Reruns, Repeat of Run 101
192	18:01	18:14	1-Mar	60	229	-4	0	0.1372	No	0	0	0	1.5x10 6	on	on	Repeat of Run 119
193	18:20	18:35	1-Mar	60	229	0	0	0.1114	No	0	0	0	1.5x10 6	on	on	Repeat of Run 120

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
194	18:41	19:01	1-Mar	60	287	0	0	0.111	No	0	0	0	1.5x10 6	on	on	Repeat of Run 127
195	19:06	19:17	1-Mar	60	286	-4	0	0.1367	No	0	0	0	1.5x10 6	on	on	Completes Bseline reruns at Beta=0°, Repeat of Run 128
196	21:29	21:46	1-Mar	60	288	0	4	0.1059	No	0	0	0	1.5x10 6	on	on	Moved Pitot probe , Repeat of Run 131
197	21:51	22:03	1-Mar	60	288	-4	4	0.1368	No	0	0	0	1.5x10 6	on	on	Repeat of Run 130
198	22:09	22:20	1-Mar	60	228	-4	4	0.1368	No	0	0	0	1.5x10 6	on	on	Repeat of Run 139
199	22:25	22:42	1-Mar	60	228	0	4	0.111	No	0	0	0	1.5x10 6	on	on	Repeat of Run 138
200	22:49	23:03	1-Mar	60	168	0	4	0.1107	No	0	0	0	1.5x10 6	on	on	Repeat of Run 141
201	23:08	23:24	1-Mar	60	168	-4	4	0.1108	No	0	0	0	1.5x10 6	on	on	Est 5 days to knuckle change, Repeat of Run 140
202	7:59	8:10	2-Mar	60	0	-4	4	0.1378	No	0	0	0	1.5x10 6	on	on	Repeat of Run 147
203	8:14	8:34	2-Mar	60	0	0	4	0.1108	No	0	0	0	1.5x10 6	on	on	Repeat of Run 146
204	9:43	10:01	2-Mar	0	168	0	0	0.111	No	0	-20	0	0	on	on	Static Runs body flap -20°
205	10:10	10:35	2-Mar	0	230	0	0	0.111	No	0	-20	0	0	on	on	
206	10:37	11:03	2-Mar	0	288	0	0	0.1107	No	0	-20	0	0	on	on	
207	11:10	11:12	2-Mar	60	0	8	0	0.6735	No	0	-20	0	1.5x10 6	on	on	Wind on BFE
208	11:14	11:20	2-Mar	60	0	4	0	0.3819	No	0	-20	0	1.5x10 6	on	on	
209	11:25	11:45	2-Mar	60	0	0	0	0.1113	No	0	-20	0	1.5x10 6	on	on	
210	14:27	14:37	2-Mar	60	0	-4	0	0.1388	No	0	-20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
211	14:46	14:54	2-Mar	60	288	-4	0	0.1365	No	0	-20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
212	14:59	15:14	2-Mar	60	288	0	0	0.111	No	0	-20	0	1.5x10 6	on	on	Point 10 was a bad point, low Pbel
213	15:14	15:36	2-Mar	60	288	4	0	0.3819	No	0	-20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
214	15:41	16:00	2-Mar	60	228	4	0	0.3819	No	0	-20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
215	16:07	16:21	2-Mar	60	228	0	0	0.1203	No	0	-20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
216	16:25	16:38	2-Mar	60	228	-4	0	0.1368	No	0	-20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
217	17:40	17:52	2-Mar	60	168	-4	0	0.1368	No	0	-20	0	1.5x10 6	on	on	Had to rewind tape
218	17:58	18:15	2-Mar	60	168	0	0	0.111	No	0	-20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
219	18:20	18:26	2-Mar	60	168	4	0	0.3885	No	0	-20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
220	19:57	20:15	2-Mar	0	168	0	0	0.111	No	0	20	0	0	on	on	Q code = 0 BFE static run +20°
221	20:20	20:36	2-Mar	0	227	0	0	0.1112	No	0	20	0	0	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
222	20:40	20:55	2-Mar	0	288	0	0	0.1112	No	0	20	0	0	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
223	21:00	21:14	2-Mar	60	288	-4	0	0.1368	No	0	20	0	1.5x10 6	on	on	Runs 223 and 224 ran together
224	21:21	21:40	2-Mar	60	288	0	0	0.1112	No	0	20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
225	21:58	22:07	2-Mar	60	288	4	0	0.3627	No	0	20	0	1.5x10 6	on	on	contains a void point
226	22:10	22:17	2-Mar	60	228	4	0	0.3608	No	0	20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
227	22:23	22:45	2-Mar	60	228	0	0	0.111	No	0	20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
228	22:50	23:02	2-Mar	60	228	-4	0	0.1368	No	0	20	0	1.5x10 6	on	on	Bad HMBF Reading, Channel 25 was hooked into channel 34
229	14:25	14:46	5-Mar	60	228	0	0	0.1256	No	0	20	0	1.5x10 6	on	on	Repeat of run 227 Includes weight tares, Fixed HMBF
230	14:47	14:59	5-Mar	60	228	-4	0	0.1373	No	0	20	0	1.5x10 6	on	on	Repeat of run 228
231	13:03	15:14	5-Mar	60	168	-4	0	0.1373	No	0	20	0	1.5x10 6	on	on	
232	15:19	15:35	5-Mar	60	168	0	0	0.112	No	0	20	0	1.5x10 6	on	on	
233	15:40	15:46	5-Mar	60	168	4	0	0.36	No	0	20	0	1.5x10 6	on	on	
234	15:51	15:58	5-Mar	60	0	4	0	0.3894	No	0	20	0	1.5x10 6	on	on	
235	16:04	16:18	5-Mar	60	0	0	0	0.113	No	0	20	0	1.5x10 6	on	on	
236	16:23	16:34	5-Mar	60	0	-4	0	0.1369	No	0	20	0	1.5x10 6	on	on	
237	18:22	18:40	5-Mar	0	169	0	0	0.111	No	20	-20	0	0	on	on	Speed Brake Static Runs
238	18:41	18:57	5-Mar	0	228	0	0	0.111	No	20	-20	0	0	on	on	
239	19:02	19:19	5-Mar	0	290	0	0	0.111	No	20	-20	0	0	on	on	
240	19:23	19:41	5-Mar	60	290	0	0	0.111	No	20	-20	0	1.5x10 6	on	on	Speed Brake Effectiveness
241	19:45	19:51	5-Mar	60	290	4	0	0.376	No	20	-20	0	1.5x10 6	on	on	
242	19:56	20:06	5-Mar	60	290	-4	0	0.137	No	20	-20	0	1.5x10 6	on	on	
243	21:32	21:42	5-Mar	60	228	-4	0	0.1369	No	20	-20	0	1.5x10 6	on	on	
244	21:47	22:03	5-Mar	60	228	0	0	0.1112	No	20	-20	0	1.5x10 6	on	on	
245	22:08	22:15	5-Mar	60	228	4	0	0.3812	No	20	-20	0	1.5x10 6	on	on	

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
246	22:20	22:25	5-Mar	60	168	4	0	0.3786	No	20	-20	0	1.5x10 6	on	on	
247	22:30	22:47	5-Mar	60	168	0	0	0.1109	No	20	-20	0	1.5x10 6	on	on	
248	22:53	23:03	5-Mar	60	168	-4	0	0.1374	No	20	-20	0	1.5x10 6	on	on	
249	23:08	23;19	5-Mar	60	0	-4	0	0.1368	No	20	-20	0	1.5x10 6	on	on	
250	23:24	23:38	5-Mar	60	0	0	0	0.1114	No	20	-20	0	1.5x10 6	on	on	
251	9:16	9:23	6-Mar	60	0	4	0	0.3879	No	20	-20	0	1.5x10 6	on	on	SBE Did not go to tape
252	11:43	11:57	6-Mar	0	168	0	0	0.1095	No	0	10	0	0	on	on	10° Body Flap runs NPR=75%
253	13:28	13:43	6-Mar	0	230	0	0	0.1109	No	0	10	0	0	on	on	NPR=100%
254	13:53	14:14	6-Mar	0	290	0	0	0.1109	No	0	10	0	0	on	on	NPR=125%
255	14:20	14:30	6-Mar	60	290	-4	0	0.137	No	0	10	0	1.5x10 6	on	on	Q=60
256	14:37	14:58	6-Mar	60	288	0	0	0.1203	No	0	10	0	1.5x10 6	on	on	
257	15:01	15:17	6-Mar	60	288	4	0	0.3689	No	0	10	0	1.5x10 6	on	on	HGT 22.134
258	15:18	15:19	6-Mar	60	227	4	0	0.3697	No	0	10	0	1.5x10 6	on	on	HGT 22.184
259	15:23	15:41	6-Mar	60	227	0	0	0.1112	No	0	10	0	1.5x10 6	on	on	Came down to change tape
260	16:37	16:49	6-Mar	60	228	-4	0	0.137	No	0	10	0	1.5x10 6	on	on	
261	16:55	17:07	6-Mar	60	168	-4	0	0.137	No	0	10	0	1.5x10 6	on	on	
262	17:10	17:27	6-Mar	60	168	0	0	0.1111	No	0	10	0	1.5x10 6	on	on	
263	17:38	17:45	6-Mar	60	168	4	0	0.3813	No	0	10	0	1.5x10 6	on	on	
264	17:51	17:58	6-Mar	60	0	4	0	0.3813	No	0	10	0	1.5x10 6	on	on	
265	18:03	18:19	6-Mar	60	0	0	0	0.111	No	0	10	0	1.5x10 6	on	on	
266	18:24	18:37	6-Mar	60	0	4	0	0.1369	No	0	10	0	1.5x10 6	on	on	Repeat of Run 264
267	20:15	20:35	6-Mar	0	168	0	0	0.111	No	20	0	0	0	on	on	Static run Elevon Effectiveness
268	20:40	20:56	6-Mar	0	228	0	0	0.1115	No	20	0	0	0	on	on	
269	21:03	21:17	6-Mar	0	288	0	0	0.111	No	20	0	0	0	on	on	
270	21:27	21:38	6-Mar	60	288	-4	0	0.1368	No	20	0	0	1.5x10 6	on	on	Elevon +20°
271	21:44	22:02	6-Mar	60	288	0	0	0.1109	No	20	0	0	1.5x10 6	on	on	

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
272	22:08	22:13	6-Mar	60	288	4	0	0.3695	No	20	0	0	1.5x10 6	on	on	
273	22:18	22:26	6-Mar	60	228	4	0	0.3695	No	20	0	0	1.5x10 6	on	on	
274	22:29	22:46	6-Mar	60	228	0	0	0.111	No	20	0	0	1.5x10 6	on	on	
275	22:51	23:01	6-Mar	60	228	-4	0	0.1368	No	20	0	0	1.5x10 6	on	on	Wind on at 21:23 HMELV 2.4 inlbs
276	8:27	8:40	7-Mar	60	168	-4	0	0.137	No	20	0	0	1.5x10 6	on	on	HGT check Elevon Effectiveness Runs ELEV=20°
277	8:45	9:06	7-Mar	60	168	0	0	0.1111	No	20	0	0	1.5x10 6	on	on	
278	9:12	9:20	7-Mar	60	168	4	0	0.3797	No	20	0	0	1.5x10 6	on	on	
279	9:26	9:39	7-Mar	60	0	-4	0	0.137	No	20	0	0	1.5x10 6	on	on	
280	9:44	10:03	7-Mar	60	0	0	0	0.1108	No	20	0	0	1.5x10 6	on	on	
281	10:09	10:16	7-Mar	60	0	4	0	0.3655	No	20	0	0	1.5x10 6	on	on	
282	11:50	12:12	7-Mar	0	168	0	0	0.1105	No	-20	0	0	0	on	on	Elevon -20°
283	13:11	13:32	7-Mar	0	226	0	0	0.11	No	-20	0	0	0	on	on	
284	13:37	13:54	7-Mar	0	288	0	0	0.1113	No	-20	0	0	0	on	on	
285	14:03	14:14	7-Mar	60	288	-4	0	0.1374	No	-20	0	0	1.5x10 6	on	on	
286	14:19	14:35	7-Mar	60	288	0	0	0.1112	No	-20	0	0	1.5x10 6	on	on	
287	14:39	14:45	7-Mar	60	290	4	0	0.3583	No	-20	0	0	1.5x10 6	on	on	
288	14:52	14:59	7-Mar	60	229	4	0	0.3566	No	-20	0	0	1.5x10 6	on	on	
289	15:03	15:18	7-Mar	60	228	0	0	0.1108	No	-20	0	0	1.5x10 6	on	on	
290	15:57	16:02	7-Mar	60	228	-4	0	0.1369	No	-20	0	0	1.5x10 6	on	on	Height corrected
291	16:05	16:16	7-Mar	60	168	-4	0	0.1369	No	-20	0	0	1.5x10 6	on	on	
292	16:21	16:38	7-Mar	60	168	0	0		No	-20	0	0	1.5x10 6	on	on	Height Check, New Tape
293	17:45	17:51	7-Mar	60	168	4	0	0.3915	No	-20	0	0	1.5x10 6	on	on	
294	17:56	18:02	7-Mar	60	0	4	0	0.3887	No	-20	0	0	1.5x10 6	on	on	
295	18:08	18:26	7-Mar	60	0	0	0	0.1109	No	-20	0	0	1.5x10 6	on	on	
296	18:29	18:40	7-Mar	60	0	-4	0		No	-20	0	0	1.5x10 6	on	on	
297	20:25	20:42	7-Mar	0	168	0	0	0.111	No	-10	0	0	0	on	on	Static Runs ELEV -10°

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
298	20:51	21:08	7-Mar	0	228	0	0	0.1208	No	-10	0	0	0	on	on	
299	21:14	21:32	7-Mar	0	288	0	0	0.1113	No	-10	0	0	0	on	on	
300	21:40	21:55	7-Mar	60	288	0	0	0.111	No	-10	0	0	1.5x10 6	on	on	
301	21:59	22:12	7-Mar	60	288	-4	0	0.137	No	-10	0	0	1.5x10 6	on	on	
302	22:20	22:26	7-Mar	60	288	4	0	0.3658	No	-10	0	0	1.5x10 6	on	on	
303	22:27	22:36	7-Mar	60	228	4	0	0.3658	No	-10	0	0	1.5x10 6	on	on	
304	22:40	22:55	7-Mar	60	228	0	0	0.111	No	-10	0	0	1.5x10 6	on	on	
305	23:00	23:12	7-Mar	60	228	-4	0	0.1367	No	-10	0	0	1.5x10 6	on	on	
306	23:15	23:26	7-Mar	60	168	-4	0	0.1367	No	-10	0	0	1.5x10 6	on	on	
307	7:45	8:20	8-Mar	60	168	0	0	0.111	No	-10	0	0	1.5x10 6	on	on	New height procedure
308	8:55	9:10	8-Mar	60	170	4	0	0.3874	No	-10	0	0	1.5x10 6	on	on	
309	9:14	9:20	8-Mar	60	0	4	0	0.3887	No	-10	0	0	1.5x10 6	on	on	
310	9:25	9:46	8-Mar	60	0	0	0	0.111	No	-10	0	0	1.5x10 6	on	on	
311	9:50	10:01	8-Mar	60	0	-4	0	0.137	No	-10	0	0	1.5x10 6	on	on	
312	11:15	11:35	8-Mar	0	170	0	0	0.111	No	10	0	0	0	on	on	
313	11:37	11:48	8-Mar	0	228	0	0	0.111	No	10	0	0	0	on	on	Static runs ELEV10° Measure elevon at alpha 0° (see notes)
314	11:50	13:05	8-Mar	0	289	0	0	0.111	No	10	0	0	0	on	on	
315	13:07	13:46	8-Mar	60	288	4	0	0.3846	No	10	0	0	1.5x10 6	on	on	
316	13:51	14:12	8-Mar	60	287	0	0	0.1106	Yes	10	0	0	1.5x10 6	on	on	
317	14:17	14:32	8-Mar	60	287	-4	0	0.1377	No	10	0	0	1.5x10 6	on	on	No Kulite data, regular running
318	14:35	14:41	8-Mar	60	229	4	0	0.37	No	10	0	0	1.5x10 6	on	on	HGT update (no good)
319	14:45	15:01	8-Mar	60	229	0	0	0.111	No	10	0	0	1.5x10 6	on	on	
320	15:06	15:18	8-Mar	60	229	-4	0	0.1371	No	10	0	0	1.5x10 6	on	on	
321	15:24	15:31	8-Mar	60	168	4	0	0.3628	No	10	0	0	1.5x10 6	on	on	HGT update (no good)
322	15:35	15:50	8-Mar	60	170	0	0	0.111	No	10	0	0	1.5x10 6	on	on	
323	15:57	16:08	8-Mar	60	169	-4	0	0.1368	No	10	0	0	1.5x10 6	on	on	Came down to change tape

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
324	17:09	17:20	8-Mar	60	0	- 4	0	0.1368	No	10	0	0	1.5x10 6	on	on	
325	17:25	17:42	8-Mar	60	0	0	0	0.1109	No	10	0	0	1.5x10 6	on	on	
326	17:47	17:53	8-Mar	60	0	4	0	0.3862	No	10	0	0	1.5x10 6	on	on	
327	20:54	21:10	8-Mar	60	168	0	0	0.1106	Yes	0	0	0	1.5x10 6	on	off	Landing Gear off
328	21:12	21:34	8-Mar	60	168	0	4	0.1106	Yes	0	0	0	1.5x10 6	on	off	Config. # changed for 4° beta
329	21:39	22:01	8-Mar	60	228	0	4	0.1109	Yes	0	0	0	1.5x10 6	on	off	kulite hgt's: 6.6",7.8".9.6",15",45"
330	22:05	22:24	8-Mar	60	228	0	0	0.1109	Yes	0	0	0	1.5x10 6	on	off	config. # change
331	22:30	22:55	8-Mar	60	288	0	0	0.1109	Yes	0	0	0	1.5x10 6	on	off	
332	22:57	23:16	8-Mar	0	288	0	0	0.1109	No	0	0	0	0	on	off	Static runs
333	23:19	23:34	8-Mar	0	228	0	0	0.1109	No	0	0	0	0	on	off	Static runs
334	8:30	8:47	9-Mar	0	168	0	0	0.1048	No	0	0	0	0	on	off	Static runs HGT 6.2910
335	8:55	9:14	9-Mar	60	288	0	0	0.0975	No	0	0	0	1.5x10 6	on	off	Mast lower HGT=5.8520, Repeat of Run 331
336	9:19	9:37	9-Mar	60	288	0	4	0.0908	No	0	0	0	1.5x10 6	on	off	Mast lower HGT=5.448
337	9:43	10:00	9-Mar	60	0	0	4	0.08237	No	0	0	0	1.5x10 6	on	off	Mast lower HGT=4.9422
338	10:07	10:26	9-Mar	60	0	0	0	0.07844	No	0	0	0	1.5x10 6	on	off	Mast lower HGT=4.7063
339	10:28	10:55	9-Mar	0	168	0	0	0.111	No	0	0	0	0	off	on	Sidewalls Off Static Runs
340	13:10	13:26	9-Mar	0	228	0	0	0.111	No	0	0	0	0	off	on	
341	13:31	13:54	9-Mar	0	288	0	0	0.1102	No	0	0	0	0	off	on	
342	13:59	14:09	9-Mar	60	288	- 4	0	0.137	Yes	0	0	0	1.5x10 6	off	on	kulite hgt's: 6.6",7.8".9.6",15",24",45"
343	14:11	14:33	9-Mar	60	288	0	0	0.11	Yes	0	0	0	1.5x10 6	off	on	
344	14:38	14:52	9-Mar	60	288	4	0	0.39	Yes	0	0	0	1.5x10 6	off	on	
345	14:58	15:02	9-Mar	60	228	4	0	0.392	Yes	0	0	0	1.5x10 6	off	on	
346	15:04	15:28	9-Mar	60	228	0	0	0.1105	Yes	0	0	0	1.5x10 6	off	on	
347	15:34	15:48	9-Mar	60	228	- 4	0	0.1372	Yes	0	0	0	1.5x10 6	off	on	Coming Down for tape rewind
348	16:54	17:19	9-Mar	60	168	- 4	0	0.1372	Yes	0	0	0	1.5x10 6	off	on	
349	17:22	17:46	9-Mar	60	168	0	0	0.1105	Yes	0	0	0	1.5x10 6	off	on	

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
350	17:53	18:01	9-Mar	60	168	4	0	0.3823	Yes	0	0	0	1.5x10 6	off	on	
351	18:07	18:15	9-Mar	60	0	4	0	0.3804	Yes	0	0	0	1.5x10 6	off	on	
352	18:20	18:41	9-Mar	60	0	0	0	0.1105	Yes	0	0	0	1.5x10 6	off	on	Kulite data stopped at h/l 0.4007
353	18:46	18:57	9-Mar	60	0	-4	0	0.1372	No	0	0	0	1.5x10 6	off	on	Last Run before knuckle change
354	17:01	17:15	12-Mar	0	168	14	0	0.0417	No	0	0	0	0	on	on	alpha 14° Baseline Static Runs
355	17:16	17:30	12-Mar	0	228	14	0	0.0417	No	0	0	0	0	on	on	
356	17:36	17:51	12-Mar	0	288	14	0	0.0417	No	0	0	0	0	on	on	
357	20:55	21:18	12-Mar	60	288	12	0		Yes	0	0	0	1.5x10 6	on	on	23 min run time, Repeat of Run 124
358	21:26	21:47	12-Mar	60	288	14	0	0.04377	Yes	0	0	0	1.5x10 6	on	on	20 min run time
359	21:54	22:09	12-Mar	60	288	16	0	0.06785	Yes	0	0	0	1.5x10 6	on	on	15 min run time
360	22:16	22:35	12-Mar	60	228	16	0	0.06702	Yes	0	0	0	1.5x10 6	on	on	25 min run time
361	22:42	22:48	12-Mar	60	228	14	0	0.04356	Yes	0	0	0	1.5x10 6	on	on	Got first 4 points, then tape ran out!
362	8:10	8:31	13-Mar	60	228	14	0	0.043	Yes	0	0	0	1.5x10 6	on	on	Repeating Run 361
363	8:33	8:59	13-Mar	60	228	12	0	0.05	Yes	0	0	0	1.5x10 6	on	on	Continue with Baseline runs, Repeat of Run 123
364	9:03	9:26	13-Mar	60	168	12	0	0.0514	Yes	0	0	0	1.5x10 6	on	on	Repeat of Run 96
365	9:30	9:56	13-Mar	60	169	14	0	0.0439	Yes	0	0	0	1.5x10 6	on	on	
366	10:01	10:25	13-Mar	60	168	16	0	0.06752	Yes	0	0	0	1.5x10 6	on	on	
367	11:00	11:27	13-Mar	60	0	16	0	0.067	Yes	0	0	0	1.5x10 6	on	on	
368	11:30	11:55	13-Mar	60	0	14	0	0.043	Yes	0	0	0	1.5x10 6	on	on	
369	12:53	13:13	13-Mar	60	0	12	0	0.05	No	0	0	0	1.5x10 6	on	on	24° Knuckle Baseline, Repeat of Run 95
370	13:22	13:35	13-Mar	60	0	12	4	0.05073	No	0	0	0	1.5x10 6	on	on	24° Knuckle Baseline
371	13:40	13:54	13-Mar	60	0	14	4	0.04365	No	0	0	0	1.5x10 6	on	on	24° Knuckle Baseline
372	14:00	14:14	13-Mar	60	0	16	4	0.06674	No	0	0	0	1.5x10 6	on	on	24° Knuckle Baseline
373	14:35	14:47	13-Mar	60	168	16	4	0.067	No	0	0	0	1.5x10 6	on	on	Checked Height
374	14:52	15:10	13-Mar	60	168	14	4	0.04352	No	0	0	0	1.5x10 6	on	on	Ran Out of Tape
375	16:21	16:39	13-Mar	60	168	14	4	0.04352	No	0	0	0	1.5x10 6	on	on	Repeat of Run 374

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
376	16:41	16:54	13-Mar	60	168	12	4	0.05022	No	0	0	0	1.5x10 6	on	on	
377	17:00	17:25	13-Mar	60	228	12	4	0.06041	No	0	0	0	1.5x10 6	on	on	Repeat of Run 135
378	17:29	17:45	13-Mar	60	228	14	4	0.04388	No	0	0	0	1.5x10 6	on	on	
379	17:51	18:02	13-Mar	60	228	16	4	0.06688	No	0	0	0	1.5x10 6	on	on	
380	18:32	18:43	13-Mar	60	288	16	4	0.06688	No	0	0	0	1.5x10 6	on	on	
381	18:47	19:04	13-Mar	60	288	14	4		No	0	0	0	1.5x10 6	on	on	
382	19:07	19:20	13-Mar	60	288	12	4		No	0	0	0	1.5x10 6	on	on	Tunnel Down and off for Model Change, Repeat of Run 134
383	21:12	21:13	13-Mar	0	228	14	0	0.4	No	0	10	0	0	on	on	Body Flap =10° , Static Run, BF not Gaged
384	21:19	21:34	13-Mar	60	288	14	0	0.05003	No	0	10	0	1.5x10 6	on	on	Q=60 Min. height is 3"
385	21:35	21:52	13-Mar	60	288	12	0	0.04986	No	0	10	0	1.5x10 6	on	on	Time includes ESP calabration 22 minutes
386	21:53	22:08	13-Mar	60	288	16	0	0.0668	No	0	10	0	1.5x10 6	on	on	Time includes ESP calabration 17 minutes
387	22:31	22:42	13-Mar	60	228	16	0	0.0668	No	0	10	0	1.5x10 6	on	on	
388	22:43	23:00	13-Mar	60	228	14	0	0.0525	No	0	10	0	1.5x10 6	on	on	Time includes ESP calabration
389	23:03	23:17	13-Mar	60	228	12	0	0.05013	No	0	10	0	1.5x10 6	on	on	
390	8:03	8:13	14-Mar	60	168	12	0	0.0605	No	0	10	0	1.5x10 6	on	on	
391	8:18	8:31	14-Mar	60	168	14	0	0.05128	No	0	10	0	1.5x10 6	on	on	
392	8:36	8:48	14-Mar	60	168	16	0	0.06666	No	0	10	0	1.5x10 6	on	on	
393	10:27	10:44	14-Mar	60	168-288	12.-16	0	0.3998	No	0	10	0	1.5x10 6	on	on	Pressure Check Out Run - Fixed CW, Throat Area, & CTI
394	10:49	11:00	14-Mar	60	0	16	0	0.06666	No	0	10	0	1.5x10 6	on	on	
395	11:05	11:17	14-Mar	60	0	14	0	0.0512	No	0	10	0	1.5x10 6	on	on	
396	11:22	11:33	14-Mar	60	0	12	0	0.05	No	0	10	0	1.5x10 6	on	on	
397			14-Mar	0	228	14	0	0.05	No	0	20	0	0	on	on	+20° Body Flap, Static Run, Wrong HMBF Constant
398			14-Mar	60	288	14	0	0.05	No	0	20	0	1.5x10 6	on	on	Wrong HMBF Constant -Will correct on tape
399			14-Mar	60	288	12	0	0.05	No	0	20	0	1.5x10 6	on	on	Wrong HMBF Constant -Will correct on tape
400	13:53	14:05	14-Mar	60	288	16	0	0.06658	No	0	20	0	1.5x10 6	on	on	Wrong HMBF Constant -Will correct on tape
401	14:10	14:21	14-Mar	60	228	16	0	0.06741	No	0	20	0	1.5x10 6	on	on	Wrong HMBF Constant -Will correct on tape

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
402	14:20	14:43	14-Mar	60	228	14	0	0.05	No	0	20	0	1.5x10 6	on	on	Wrong HMBF Constant -Will correct on tape
403	17:00	17:13	14-Mar	60	228	14	0		No	0	20	0	1.5x10 6	on	on	Updated HMBF Constant, Repeat of Run 402
404	17:16	17:35	14-Mar	60	228	12	0	0.05081	No	0	20	0	1.5x10 6	on	on	
405	18:05	18:24	14-Mar	60	168	12	0	0.05081	No	0	20	0	1.5x10 6	on	on	Height Check, off by 0.8 inches
406	18:28	18:45	14-Mar	60	168	16	0	0.06728	No	0	20	0	1.5x10 6	on	on	
407	18:47	18:58	14-Mar	60	168	14	0		No	0	20	0	1.5x10 6	on	on	
408	19:15	19:24	14-Mar	60	0	12	0	0.06045	No	0	20	0	1.5x10 6	on	on	
409	19:27	19:45	14-Mar	60	0	14	0	0.060215	No	0	20	0	1.5x10 6	on	on	
410	19:47	19:58	14-Mar	60	0	16	0	0.080449	No	0	20	0	1.5x10 6	on	on	Height Check, off by 0.3 inches
411	21:18	21:23	14-Mar	60	168	12.-16	0	0.9847	No	0	0	0	1.5x10 6	on	on	ESP Calibration, Changes HMBF Constants
412	21:28	21:34	14-Mar	60	228	16-12	0	1.003	No	0	0	0	1.5x10 6	on	on	Baseline Check
413	21:35	21:44	14-Mar	60	288	12.-16	0	0.9858	No	0	0	0	1.5x10 6	on	on	Baseline Check
414	21:59	22:14	14-Mar	60	0	14	0	0.06008	No	0	0	0	1.5x10 6	on	on	Repeat of run 368
415	22:16	22:31	14-Mar	60	228	14	0	0.06008	No	0	0	0	1.5x10 6	on	on	Repeat of run 362
416	22:33	22:47	14-Mar	60	228	16	0	0.0606	No	0	0	0	1.5x10 6	on	on	Repeat of run 360
417	22:52	23:05	14-Mar	60	288	14	0		No	0	0	0	1.5x10 6	on	on	Repeat of run 358
418	8:25	8:26	15-Mar	0	228	14	0		No	0	-20	0	0	on	on	BFE Static Run -20°
419	8:30	8:44	15-Mar	60	228	12	0	0.0503	No	0	-20	0	1.5x10 6	on	on	Body Flap Effectiveness
420	8:49	9:01	15-Mar	60	228	14	0	0.06045	No	0	-20	0	1.5x10 6	on	on	
421	9:07	9:19	15-Mar	60	228	16	0	0.06761	No	0	-20	0	1.5x10 6	on	on	
422	9:23	9:36	15-Mar	60	288	12	0	0.06007	No	0	-20	0	1.5x10 6	on	on	Height Check, off 1 inch, corrected
423	9:38	9:54	15-Mar	60	228	14	0	0.05109	No	0	-20	0	1.5x10 6	on	on	Hgt 3.065", Repeat of Run 420
424	9:59	10:11	15-Mar	60	288	16	0	0.06774	No	0	-20	0	1.5x10 6	on	on	
425	10:20	10:40	15-Mar	60	168	12	0	0.06006	No	0	-20	0	1.5x10 6	on	on	Height Check, off 1.6 inches, corrected
426	10:40	10:57	15-Mar	60	168	14	0		No	0	-20	0	1.5x10 6	on	on	
427	11:00	11:12	15-Mar	60	168	16	0		No	0	-20	0	1.5x10 6	on	on	

168=75% 228=100% 288=125%

AJH

Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
428	11:14	11:28	15-Mar	60	0	12	0	0.0608	No	0	-20	0	1.5x10 6	on	on	
429	11:31		15-Mar	60	0	14	0		No	0	-20	0	1.5x10 6	on	on	
430		11:50	15-Mar	60	0	16	0		No	0	-20	0	1.5x10 6	on	on	
431	13:45	13:46	15-Mar	0	228	14	0		No	20	0	0	0	on	on	Height Check, off 1.4 inches, corrected
432	13:49	13:58	15-Mar	60	228	12	0	0.06043	No	20	0	0	1.5x10 6	on	on	
433	14:02	14:13	15-Mar	60	228	14	0	0.0512	No	20	0	0	1.5x10 6	on	on	
434	14:17	14:26	15-Mar	60	228	16	0	0.0677	No	20	0	0	1.5x10 6	on	on	
435	14:32	14:46	15-Mar	60	0	12	0	0.0615	No	20	0	0	1.5x10 6	on	on	
436	14:51	15:08	15-Mar	60	0	14	0	0.0518	No	20	0	0	1.5x10 6	on	on	
437	17:12	17:26	15-Mar	60	0	16	0	0.0678	No	20	0	0	1.5x10 6	on	on	Height Check, off 1.5 inches, corrected, Noticed HMELV off scale
438	17:33	17:49	15-Mar	60	288	12	0	0.0603	No	20	0	0	1.5x10 6	on	on	
439	17:55	18:05	15-Mar	60	288	14	0	0.0504	No	20	0	0	1.5x10 6	on	on	Taps S6,14,9 were plugged
440	18:13	18:24	15-Mar	60	288	16	0	0.0679	No	20	0	0	1.5x10 6	on	on	
441	19:06	19:22	15-Mar	60	168	12	0	0.08051	No	20	0	0	1.5x10 6	on	on	Hgt check, off 0.5", corrected Fixed HMELV
442	19:24	19:39	15-Mar	60	168	14	0	0.0504	No	20	0	0	1.5x10 6	on	on	
443	19:42	20:00	15-Mar	60	168	16	0		No	20	0	0	1.5x10 6	on	on	
444	21:15	21:34	15-Mar	0	228	14	0	0.05	No	-20	0	0	0	on	on	Static Run for Elevon -20°
445	21:39	21:52	15-Mar	60	230	12	0	0.06009	No	-20	0	0	1.5x10 6	on	on	
446	21:54	22:15	15-Mar	60	228	14	0		No	-20	0	0	1.5x10 6	on	on	
447	22:17	22:28	15-Mar	60	230	16	0	0.0674	No	-20	0	0	1.5x10 6	on	on	
448	23:05	23:15	15-Mar	60	288	12	0	0.06028	No	-20	0	0	1.5x10 6	on	on	Hgt check, off by 1.1" , corrected
449	23:20	23:33	15-Mar	60	288	14	0	0.05048	No	-20	0	0	1.5x10 6	on	on	
450	15:53	16:06	15-Mar	60	288	16	0	0.06699	No	-20	0	0	1.5x10 6	on	on	Height corrected
451	16:13	16:22	15-Mar	60	168	16	0		No	-20	0	0	1.5x10 6	on	on	
452	20:08	20:19	15-Mar	60	168	14	0	0.0524	No	-20	0	0	1.5x10 6	on	on	hgt corrected, off by 0.6" Tunnel down & off
453	20:20	20:40	15-Mar	60	168	12	0	0.05996	No	-20	0	0	1.5x10 6	on	on	checked hgt before blow, off by 1.4" , corrected

168=75% 228=100% 288=125%

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Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
454	21:16	21:27	15-Mar	60	0	12	0		No	-20	0	0	1.5x10 6	on	on	
455	21:32	21:50	15-Mar	60	0	14	0	0.0524	No	-20	0	0	1.5x10 6	on	on	
456	21:53	22:13	15-Mar	60	0	16	0		No	-20	0	0	1.5x10 6	on	on	Measured elevon at -20.6° for left & right
457	13:29	13:40	19-Mar	0	227	14	0	0.05141	No	-10	0	0	0	on	on	Hgt check, off 1",, run includes weight tares
458	13:48	14:12	19-Mar	60	227	14	0	0.05141	No	-10	0	0	1.5x10 6	on	on	Elevon -10°
459	14:12	14:29	19-Mar	60	227	16	0		No	-10	0	0	1.5x10 6	on	on	
460	14:31	14:45	19-Mar	60	227	12	0	0.0801	No	-10	0	0	1.5x10 6	on	on	
461	15:00	15:18	19-Mar	60	0	12	0	0.06106	No	-10	0	0	1.5x10 6	on	on	Hgt check, off 0.9", corrected
462	15:24	15:43	19-Mar	60	0	14	0	0.05061	No	-10	0	0	1.5x10 6	on	on	
463	15:44	15:57	19-Mar	60	0	16	0	0.06682	No	-10	0	0	1.5x10 6	on	on	
464	16:50	16:52	19-Mar	0	228	14	0	0.9924	No	10	0	0	0	on	on	Elevon measured at 10.2°-right, 10.6°-left hgt off by 0.9"
465	16:53	17:06	19-Mar	60	228	14	0	0.05038	No	10	0	0	1.5x10 6	on	on	
466	17:12	17:32	19-Mar	60	228	16	0	0.06844	No	10	0	0	1.5x10 6	on	on	
467	17:35	17:48	19-Mar	60	228	12	0	0.0608	No	10	0	0	1.5x10 6	on	on	
468	17:50	18:08	19-Mar	60	0	12	0		No	10	0	0	1.5x10 6	on	on	Hgt check off by 1.2"
469	18:18	18:26	19-Mar	60	0	14	0		No	10	0	0	1.5x10 6	on	on	
470	18:29	18:44	19-Mar	60	0	16	0		No	10	0	0	1.5x10 6	on	on	
471	20:05	20:11	19-Mar	0	228	14	0		No	0	-10	0	0	on	on	Static Run Body Flap -10°
472	20:14	20:30	19-Mar	60	228	14	0		No	0	-10	0	1.5x10 6	on	on	
473	20:33	20:45	19-Mar	60	228	16	0		No	0	-10	0	1.5x10 6	on	on	
474	20:53	21:05	19-Mar	60	228	12	0	0.06023	No	0	-10	0	1.5x10 6	on	on	Hgt check off by 0.7", corrected
475																Run Number skipped
476	21:09	21:24	19-Mar	60	288	12	0	0.06023	No	0	-10	0	1.5x10 6	on	on	
477	21:31	0:00	19-Mar	60	288	14	0	0.05022	No	0	-10	0	1.5x10 6	on	on	Hgt check off by 0.9", corrected
478	21:50	22:03	19-Mar	60	288	16	0	0.06713	No	0	-10	0	1.5x10 6	on	on	
479	22:08	22:21	19-Mar	60	168	16	0	0.06713	No	0	-10	0	1.5x10 6	on	on	

168=75% 228=100% 288=125%

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Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
480	22:22	22:41	19-Mar	60	168	14	0	0.0544	No	0	-10	0	1.5x10 6	on	on	
481	22:46	23:00	19-Mar	60	168	12	0	0.0607	No	0	-10	0	1.5x10 6	on	on	
482	23:05	23:23	19-Mar	60	0	12	0	0.0602	No	0	-10	0	1.5x10 6	on	on	After_____ up on screen HGT=3.567, should be 6", corrected, M.F
483	8:00	8:17	20-Mar	60	0	14	0	0.05023	No	0	-10	0	1.5x10 6	on	on	
484	8:20	8:33	20-Mar	60	0	16	0		No	0	-10	0	1.5x10 6	on	on	
485	9:50	10:05	20-Mar	0	0	10	0	0.06667	No	20	-20	0	0	on	on	Min. height 4" w/Speed Brake
486	10:06	10:20	20-Mar	60	0	12	0		No	20	-20	0	1.5x10 6	on	on	
487	10:26	10:40	20-Mar	60	0	14	0	0.0517	No	20	-20	0	1.5x10 6	on	on	
488	10:45	11:00	20-Mar	60	0	16	0	0.0141	No	20	-20	0	1.5x10 6	on	on	model change-sidewalls off,elevons 0°, Body flap 0°
489	13:04	13:14	20-Mar	0	228	14	0	0.05094	No	0	0	0	0	off	on	Sidewall Effectiveness
490	13:15		20-Mar	60	228	14	0	0.05039	No	0	0	0	1.5x10 6	off	on	
491	13:34		20-Mar	60	228	12	0		No	0	0	0	1.5x10 6	off	on	
492	13:52		20-Mar	60	228	16	0		No	0	0	0	1.5x10 6	off	on	
493	14:15		20-Mar	60	288	16	0		No	0	0	0	1.5x10 6	off	on	
494	14:27		20-Mar	60	288	14	0	0.05106	No	0	0	0	1.5x10 6	off	on	
495	14:50		20-Mar	60	288	12	0		No	0	0	0	1.5x10 6	off	on	
496	15:07		20-Mar	60	168	12	0		No	0	0	0	1.5x10 6	off	on	
497	15:45		20-Mar	60	168	14	0		No	0	0	0	1.5x10 6	off	on	
498	16:50		20-Mar	60	168	16	0		No	0	0	0	1.5x10 6	off	on	
499	17:04	17:00	20-Mar	60	0	16	0		Yes	0	0	0	1.5x10 6	off	on	Started Kulite data
500	17:15		20-Mar	60	0	14	0	0.05026	Yes	0	0	0	1.5x10 6	off	on	
501	17:38	17:36	20-Mar	60	0	12	0	0.05026	Yes	0	0	0	1.5x10 6	off	on	
502	18:00	18:27	20-Mar	0	228	14	0		Yes	0	0	0	0	on	off	Landing Gear off Static Run
503	18:30	18:45	20-Mar	60	228	14	0		Yes	0	0	0	1.5x10 6	on	off	
504	18:49	19:01	20-Mar	60	228	16	0		Yes	0	0	0	1.5x10 6	on	off	
505	19:06	19:22	20-Mar	60	228	12	0		Yes	0	0	0	1.5x10 6	on	off	

168=75% 228=100% 288=125%

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Table 2 NAPF-1 NASA/Langley 14 x 22 Run Log

NA 90-147

Run #	Start Time	End Time	Date	Q	PBEL	Alpha	Beta	Beginning h/L	K Data	Δelv	Δbf	Δ c	Rn	F. F.	Gear	Comments
506	19:26	19:41	20-Mar	60	0	12	0		Yes	0	0	0	1.5x10 6	on	off	
507	19:45	19:58	20-Mar	60	0	14	0		Yes	0	0	0	1.5x10 6	on	off	
508	20:01	20:14	20-Mar	60	0	16	0		Yes	0	0	0	1.5x10 6	on	off	
509	21:56	21:57	20-Mar	0	228	14	0	0.75	No	0	0	0	0	on	on	Static Run
510	22:00	22:15	20-Mar	60	228	14	0-8	0.75	No	0	0	0	1.5x10 6	on	on	Beta Sweep to 8° Yaw out of ground effect
511	22:19	22:35	20-Mar	60	228	14	0-8	0.05026	No	0	0	0	1.5x10 6	on	on	Beta Sweep to 8° Yaw in ground effect, hgt check, off 1.4"
512	9:43	9:52	21-Mar	60	312	12.-16	0	0.9902	No	0	0	0	1.5x10 6	on	on	Alpha sweep at PBEL 312
513	9:53	9:59	21-Mar	60	342	16-12	0	1	No	0	0	0	1.5x10 6	on	on	Increased PBEL
514	10:07	10:16	21-Mar	60	375	12.-16	0	0.9878	No	0	0	0	1.5x10 6	on	on	Increased PBEL
515	10:19	10:27	21-Mar	0	375-312	14	0	1	No	0	0	0	0	on	on	PBEL sweep
516	10:33	10:57	21-Mar	0	228	14	0		No	0	0	0	0	on	on	HGT Check OK, Repeat of Run 355
517	10:59	11:10	21-Mar	60	228	14	0		No	0	0	0	1.5x10 6	on	on	Repeat of Run 361
518	11:12	11:30	21-Mar	60	228	16	0		No	0	0	0	1.5x10 6	on	on	Repeat of Run 360
519	12:58	13:02	21-Mar	60	228	10	0		No	0	0	0	1.5x10 6	on	on	
520	13:08	13:22	21-Mar	60	228	14	4		No	0	0	0	1.5x10 6	on	on	Repeat of Run 378
521	13:27	13:45	21-Mar	60	0	14	4	0.06052	No	0	0	0	1.5x10 6	on	on	Repeat of Run 371
522	13:46	13:57	21-Mar	60	0	10	0	0.06139	No	0	0	0	1.5x10 6	on	on	
EOT	13:57		21-Mar													

168=75% 228=100% 288=125%

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Table 3

Date	Run Number	Comment
2/22	95 - 101	ESP voltage regulator problem
2/23	108 - 109 (between)	Installed P_t / P_S rake
2/23	109 - on	ESP reference to P_∞
2/23	111	Balance voltage dropped, ESP's did not calibrate, voltage regulator broke (run 112 was a repeat of run 111) Fixed at 8:45 pm
2/26	120	ESP channels 1 through 96 read 14.98 while channels 97 through 160 read 14.62
2/26	128	At the end of the run 1 - 96 read 14.96 while 97 - 160 read 14.61 and the Rusko read 15.12
2/27	139	All ESP's calibrated to 14.97, while the Rusko read 15.059 psi
2/27 in the afternoon		Repeated runs for kulite data, the kulite data was bad due to the MODCOMP
2/27	158	ESP numbering was incorrect due to ESP interface hookup error.
2/28 9:15 am	173	ESP's calibrate fine, but suspect a pinched line, ESP numbering problem resolved, Began running Body Flap deflections of -20°
2/28 6:15 pm	before 177	Applied pressure to ESP reference line, pressures 1 through 96 did not change, but 97 through 160 did. Found a pinched line in reference line for 1 through 3.
2/28 8:50 pm	177	Wyle Co. fixed offset problem in ESP readings (0.1 psi) Rusko read 14.898, ESP 18.84. Channels 97 to 160 where drifting
3/1	181	Reference line run check out OK, ESP ref, changed to PA.
3/2		Body Flap runs were bad, BFHM channel was moved late Friday afternoon
3/2	210-228	HMBF was hooked into wrong channel on electric panel

Table 3

Date	Run Number	Comment
3/5		Found open body flap gage down stairs on the electric channel board. By 9 am the body flap and elevon were fixed
3/6	251	This run did not go on to the magnetic tape
3/6 11:25 am	252	Changed elevon and body flap tygon pressure tap jumpers
3/12		Knuckle change from 0° to 24°
3/12		Moved 24° knuckle forward of roll coupler
3/12 2:05 pm		Checked body Flap and elevon pressure taps and they looked good. Checked reference lines and they looked good
3/12 7:00 pm		Suspected pinched lines in forward, nose, ESP. Used bellows to check reference lines and it looks good
3/14 9:00 am		Found reference lines 1-3 pinched
3/14 10:15 am		Checked ESP reference lines and they are good
3/14 2:55 pm		Nose ESP out putting bad data, we believe this due to heat.
3/14	397-402	HMBF constants were incorrect
3/9		Kulite run, one half of run 352 and 353, no Kulite data was obtained.
3/13 5:10 pm		PBEL read 6 psi and PSTING read 800 psi, this was due to an open vent
3/13	397-402	Body Flap constants set for 0°
3/13	403	Body Flap constant changed
3/15	437-440 (6:00 pm)	Bad HMELV reading
3/15 6:55 pm		Unplugged and replugged elevon gage, now working
3/15 8:00 pm	437-440	Tape was left on taps S6,14 and S6,9

Table 3

Date	Run Number	Comment
3/16 7:00 am	before 457	Found condensation on model, water was completing a connection between the grounding strip and the metric part of the model.
3/16 7:30 am		Pressure lines were inadvertently melted and resulted in model break down.
3/16 3:00 pm		Model was reassembled and checked out OK. Connected channels 59, 90, & 128 to the ESP reference line manifolds.
3/16 7:00 pm		Found a calibration line crimped in the strut cover
3/16 8:40 pm		Found another crimped ESP line
3/16 9:15		Check out ESP Calibration - OK
3/19	before 457	ESP problems with pressures 1-96, reference line cut by strut fairing. Removed strut fairing, protected instrumentation lines with tape.
3/19	457-470	Runs were conducted without the strut fairing
3/19 7:00 pm		Strut fairing was grounded out and placed back on the blade strut
3/20	before 489	SR5,1; SR6,2; SR6,1; SR7,1 were plugged by plaster, but SR5,1 and SR6,1 were not hooked up. The other two taps cleaned out and seem to check out.
3/20 6:30 pm	502	After removing the landing gear and readjusting the computer, the PBEL reading jumped 10 psi, from 14.33 to 24.33 psi.
3/20 9:50 pm	509	The landing gear was put back onto the model and PBEL returned to 14.33 psi.

13.0 FIGURES

Front View of Flow Module - Looking Aft

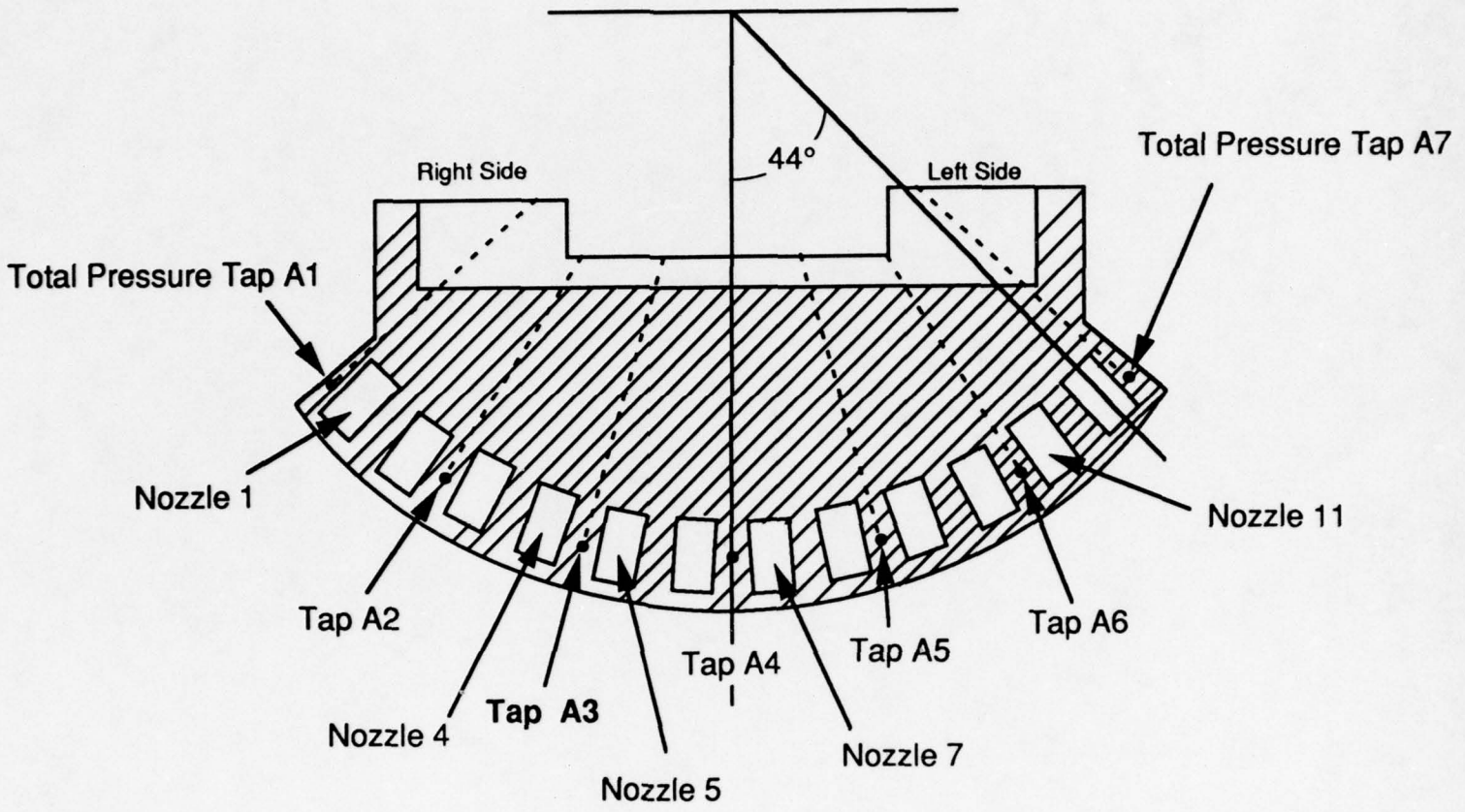
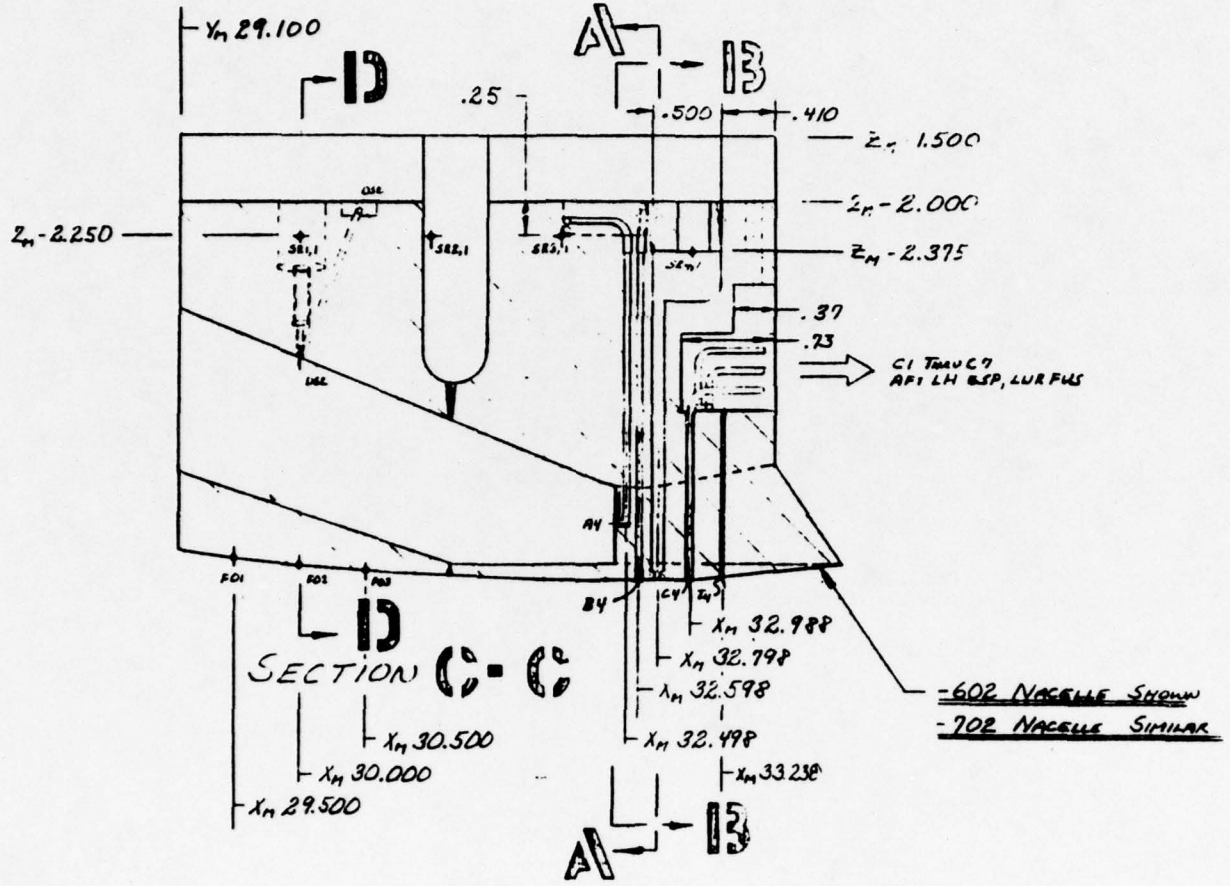


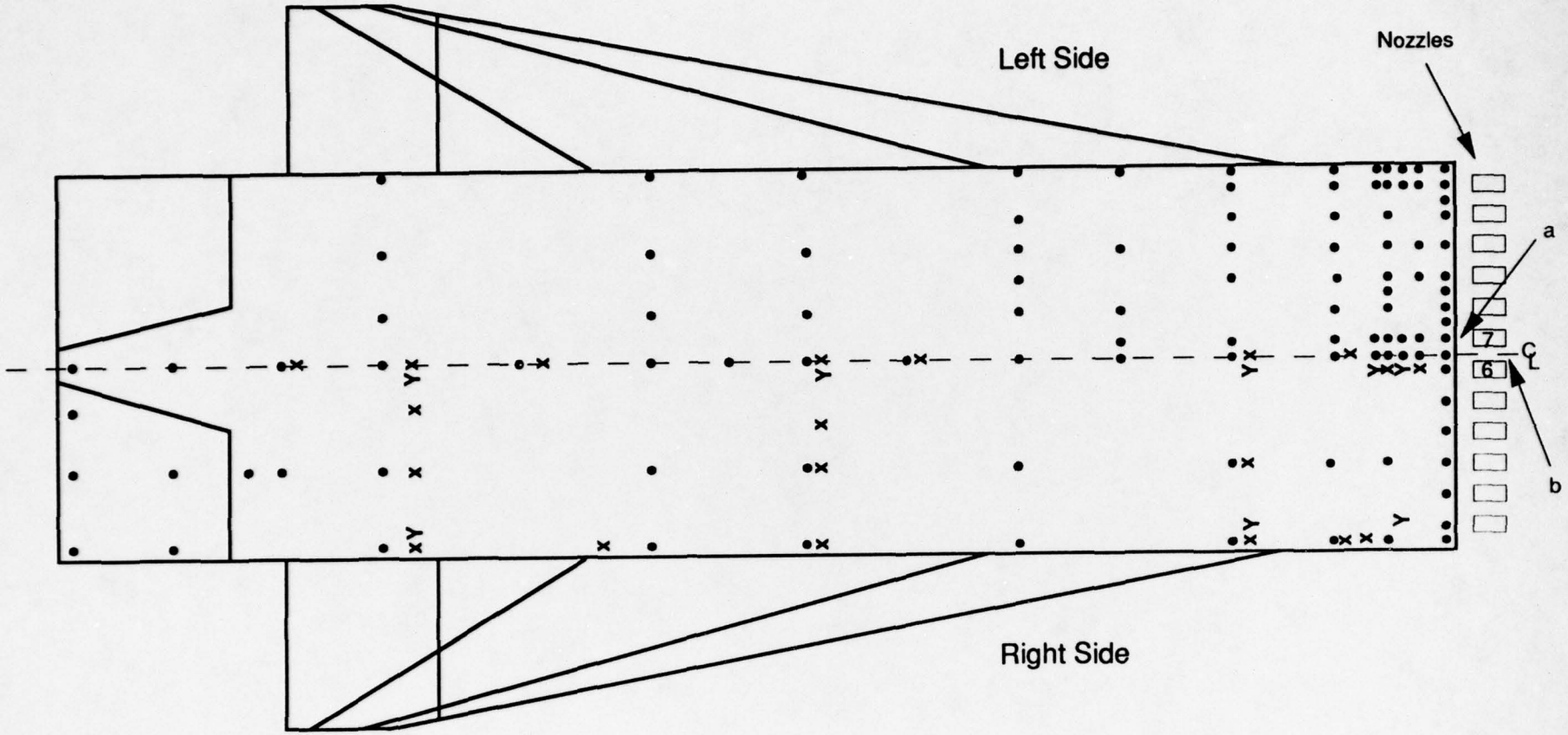
Figure 1 Total Pressure Taps & Nozzle Location for NAPF-1 Model

Figure 2
Instrumentation for Internal Nozzle (U)



UNCLASSIFIED

UNCLASSIFIED



Bottom View

o Static Pressure Taps
x Coax Thermocouples
Y Kulites

Figure 3. Instrumentation Layout on NAPF-1 Aft Body

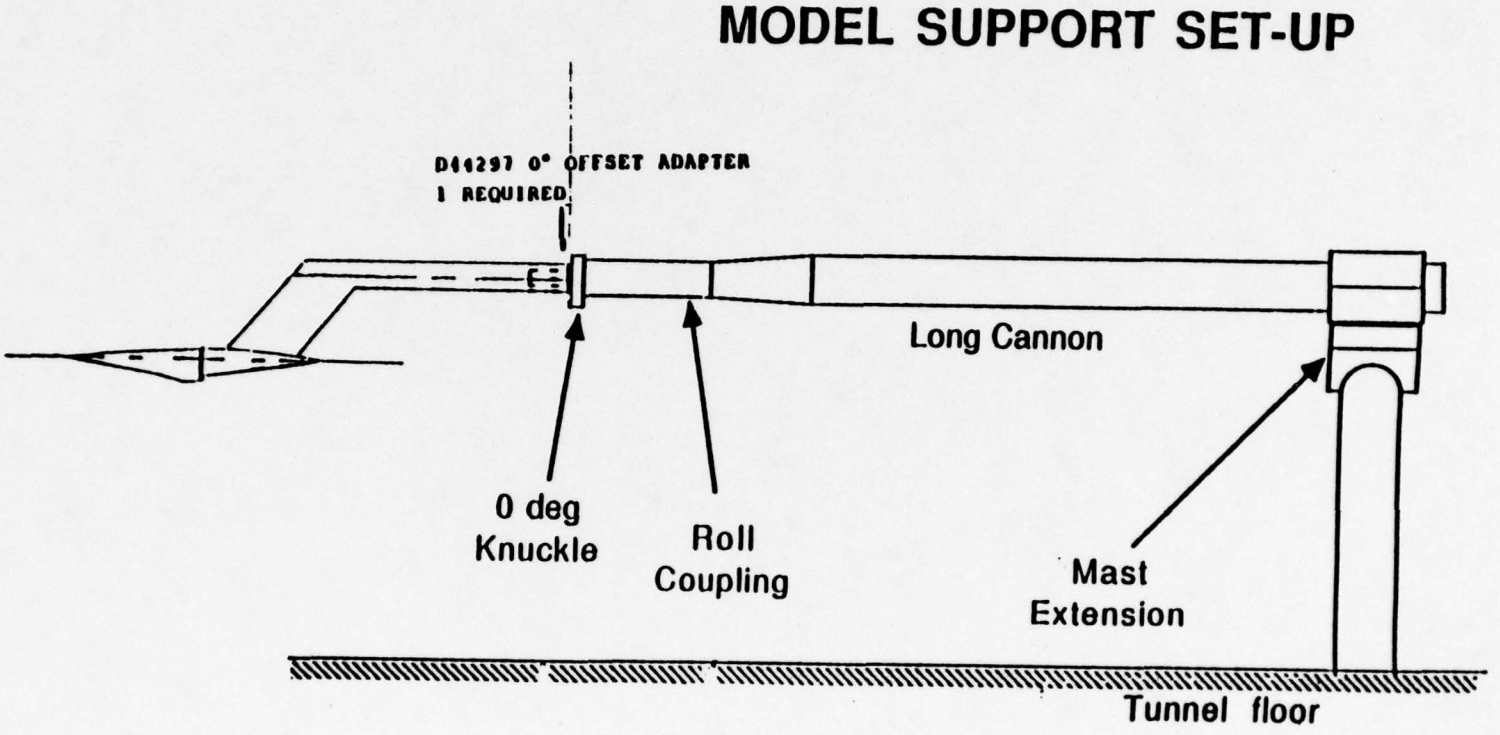


Figure 4. Model Support Set-Up
at NASA/Langley 14 x 22

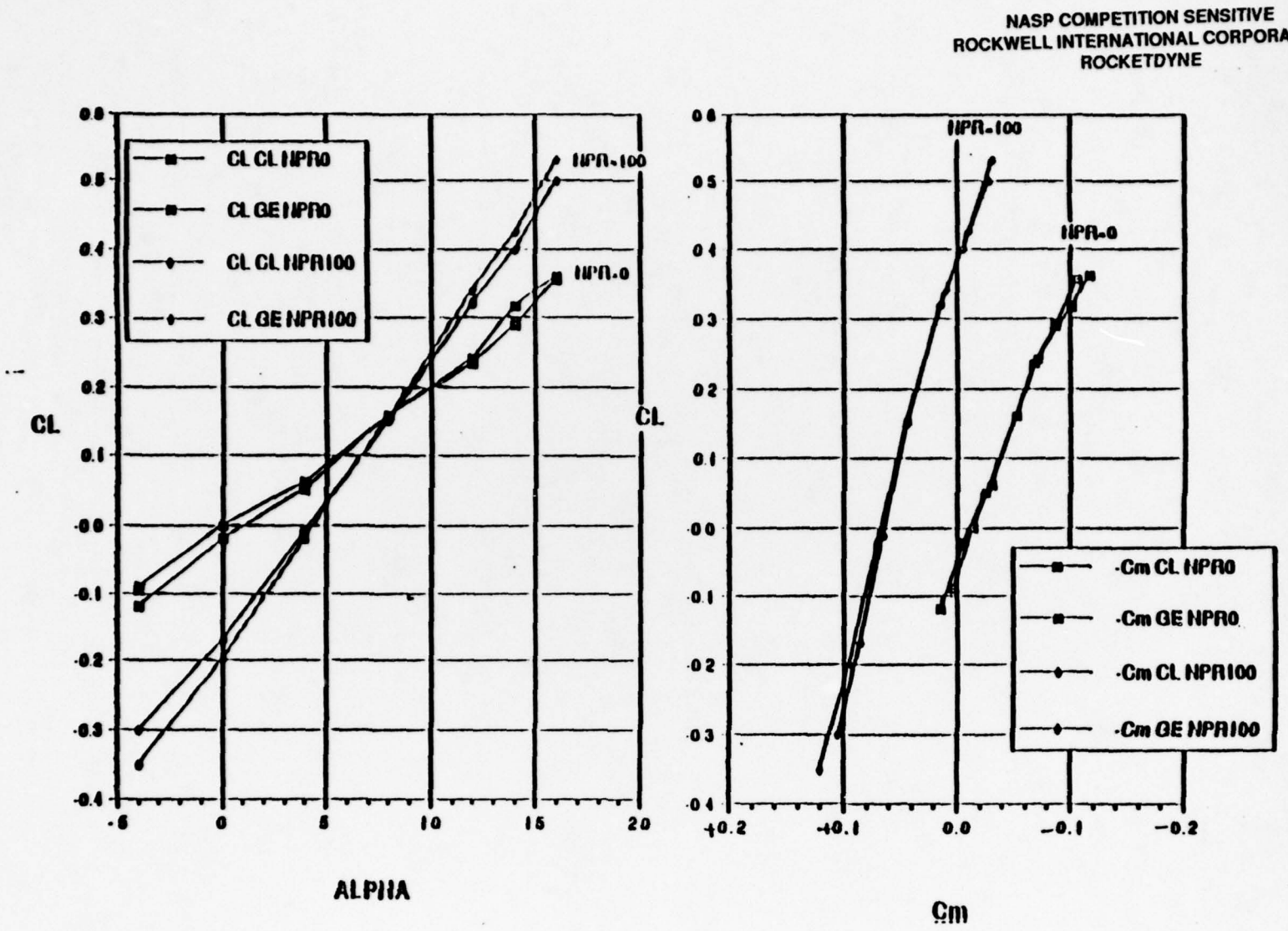


Figure 5. NAPF-1 Model Lift & Trim Characteristics

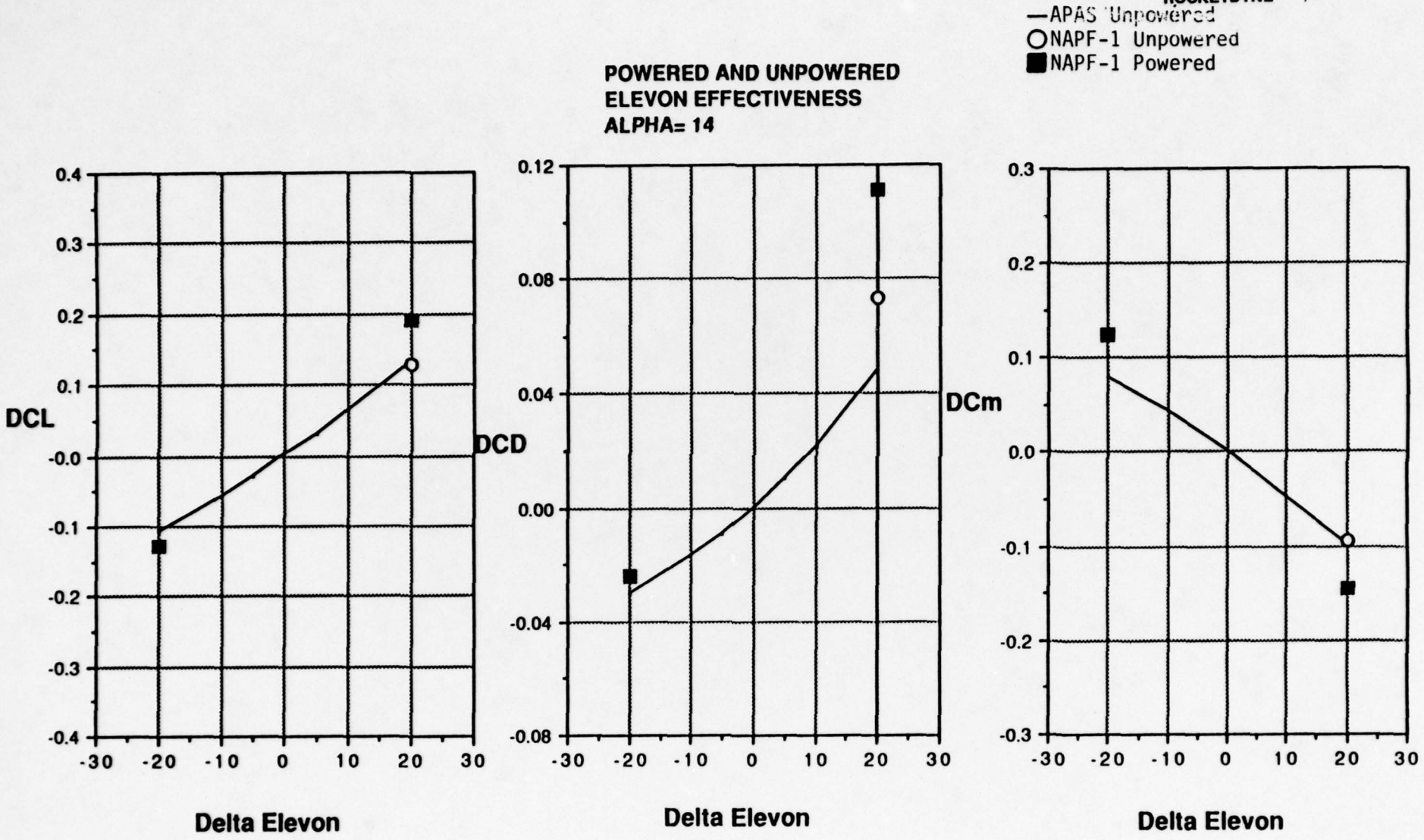


Figure 6. Body Flap Effectiveness at Alpha of 14° for the NAPF-1 Model

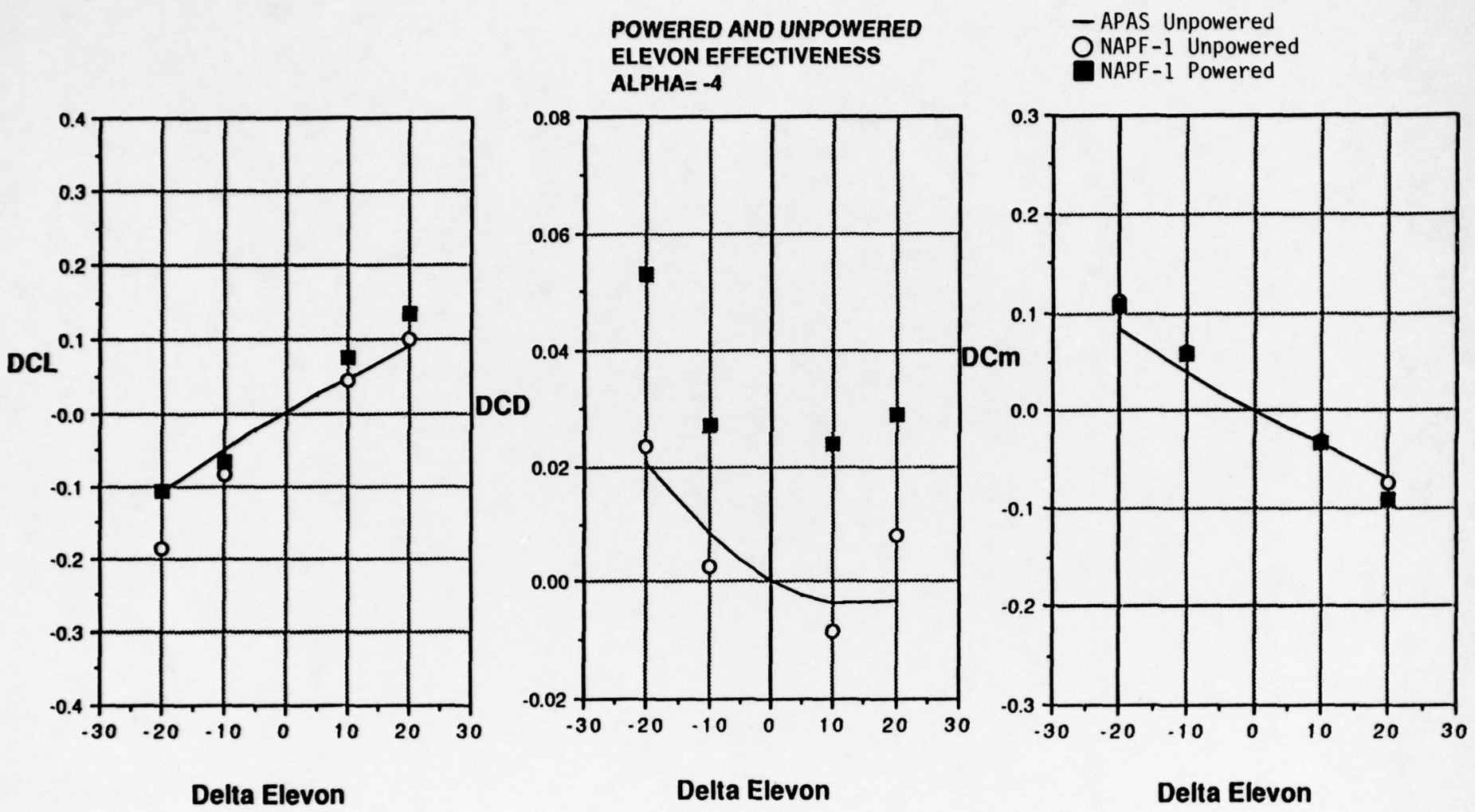


Figure 7. Body Flap Effectiveness at Alpha of -4° for the NAPF-1 Model